MARINE REVIEW

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GIANTS BATTLE FOR SHIPS.

STRUGGLE BETWEEN ROCKEFELLER AND CARNEGIE INTERESTS RESULTS IN $1.25 A TON BEING PAID FOR MOVING ORE ON THE GREAT LAKES IN 1900.

CONTRACTS FOR MORE THAN $5,000,000 WORTH OF NEW VESSELS.

A battle of giants in the iron and steel industry has been under way for three or four days past. It has been a battle for ships—ships to move the ore product of the Lake Superior region in 1900, which may crowd the twenty-million-ton mark. It finally culminated today (Thursday) in contracts for ten steamers to carry ore from the head of Lake Superior throughout next season (about 1,000,000 tons) at $1.25 a ton, against the contract rate of 60 cents a ton that has prevailed this season. This is, of course, only the first move in next year's affairs. It means that iron ore is almost certain to sell at full $2 a ton advance over the prices of the present year.

These contracts, covering eight steamers controlled by John Mitchell of Cleveland, together with the steamer Senator and a new boat building at the works of the Detroit Shipbuilding Co., were made in the interest of John D. Rockefeller, following close upon the purchase of the whaleback fleet of thirty vessels by the same interest. With ten chartered vessels and the whalebacks, the Rockefeller interest will be operating sixty-seven steel vessels next season—thirty-three steamers and thirty-four barges. The whaleback fleet will add about 1,500,000 tons capacity to the regular Bessemer fleet of twenty-seven ships (including three under construction), and the ten chartered steamers will carry close to another million tons.

This move on the part of Rockefeller's representatives is prompted, of course, by the fear of ships not being found to care for all the ore that will be required in 1900, but the immediate cause of it was a struggle between Rockefeller and Carnegie interests for supremacy in their dealings with each other. The Carnegie company, by a shrewd move last spring, managed to fix the contract ore rate at 60 cents, and Rockefeller ships, under contract with the Carnegie company for a term of years, were forced to accept about that figure for this season's work. The Carnegie company again stepped in a few days ago and placed an order with the American Ship Building Co. for five big steamers, agreeing to provide the material themselves, as it could not be had from any other source and the ships could not otherwise be built. The Carnegie company had also offered $350,000 each for the four largest of the Mitchell ships. But in the meantime the Rockefeller interest had come into full possession of the thirty whalebacks, and then not only prevented the Carnegie company from buying the Mitchell fleet, but secured a pretty fair corner on the lake freight market through the charter of these vessels.

With contracts for seven steamers closed during the past few days, the American Ship Building Co. now has on its books, for delivery running into July and August of next year, orders for twenty-one vessels, the value of which at present prices is about $5,280,000. This does not include a steamer building at Detroit that will be finished about the close of navigation. Of the twenty-one vessels to come out next year, all but one are freight carriers, and only four are tow barges. All the others are steamers. Three of them are of the Welland canal size kind, capable of carrying about 3,000 tons. The others are of the 6,000 and 8,000-ton class. These freighters will move in a single trip about 130,200 gross tons and in a full season a little more than 3,000,000 gross tons. The five Carnegie steamers, just ordered, will each be 475 feet over all, 50 feet beam, 29 feet depth and of about 7,200 gross tons capacity. They will have quadruple expansion engines (cylinders of 20½, 38½, 45 and 63 inches diameter, with 40 inches stroke) and three Scotch boilers each, the diameter of which will be 13½ feet and the length 12 feet, furnishing steam at 200 pounds pressure. It is understood that the two Welland canal size steamers, which have just been ordered by Mr. A. B. Wolvin of Duluth, are very probably for a company of Cleveland and Buffalo vessel owners who are planning for elevators and other terminal facilities at Montreal, in order to develop a large business through the enlarged St. Lawrence canals. These vessels will be duplicates of the steamer Huron—252 feet over all, 238 feet keel, 42 feet beam and 26 feet hold, with triple engines of 18½, 31½ and 51 inches by 36 inches stroke.

BAGS OF HAY USED TO RELEASE THE HARLEM.

In the days of the smaller class of old wooden boats on the lakes, it was a common practice, when they needed caulking and a dry dock could not be reached in a hurry, to run them up to a saw mill and fill their seams with sawdust. This was usually done by lowering bags of sawdust under the vessel and then untying the knot of the bag so as to release its contents. The ascending sawdust worked its way into the seams, on account of the suction produced by the leaks in the vessel. One trick of this kind suggests another. It is now said that the release of the steel steamer Harlem, which was ashore since last fall on the rocks of Isle Royale, Lake Superior, but which is now at Houghton, Mich., was accomplished largely through the use of bags of hay in filling up her shattered water bottom. Full particulars of the release of this vessel are not at hand, but Capt. Baker of the wrecking steamer Snook, who was engaged with the Harlem expedition, says of the use made of the bags of hay:

"Thirty men were put to work cutting hay on the island and it was dried over the boilers of the Snook. Then the hay and a big hawser were chopped up quite finely and divers took bags of the stuff down under the Harlem, crawling in the crevices of rock under the boat, and pushing the bags through the holes in the bottom. All the time the pumps were going, and the hay and chopped rope was sucked up through the holes in the water bottom and soon stopped them up. Then 100 shores were cut out from big trees and fastened between the deck and the water bottom. When the vessel was finally gotten afloat, it was necessary to first reach Little Siskiwit bay, fourteen miles distant. Nearly all of the twelve pumps aboard gave out before the vessel reached the bay and the suspense on the trip was awful. She was, however, safely landed on a soft clay bank in 6 feet of water, and then prepared for the trip to Houghton, where she is being patched up. The Harlem is as good as ever above the water line."

OFFICERS OF THE PITTSBURG COAL CO.

Officers of the sixty-four million dollar Pittsburg Coal Co. will not be elected until the latter part of the present week, but the list, now fully agreed upon, is as follows:

Chairman board of directors, F. L. Robbins, Pittsburg; president, F. M. Osborne, Cleveland; secretary, C. W. Baine, Cleveland; treasurer, Upson A. Andrews, Pittsburg.

Executive committee—F. L. Robbins, Pittsburg; F. M. Osborne, Cleveland; J. D. Nicholson and A. W. Mellon, bankers, Pittsburg; M. H. Taylor, Erie; D. R. Hanna and W. P. Murray, Cleveland.

Board of directors—To consist of the foregoing seven members of executive committee and the following: J. C. Dysart and Upson A. Andrews, Pittsburg; Jacob Ridgeway, banker of Philadelphia; C. W. Baine and P. M. Hitchcock of Cleveland; E. N. Saunders of St. Paul; Mr. Schley of Moore & Schley, New York, and Henry W. Oliver of Pittsburg.

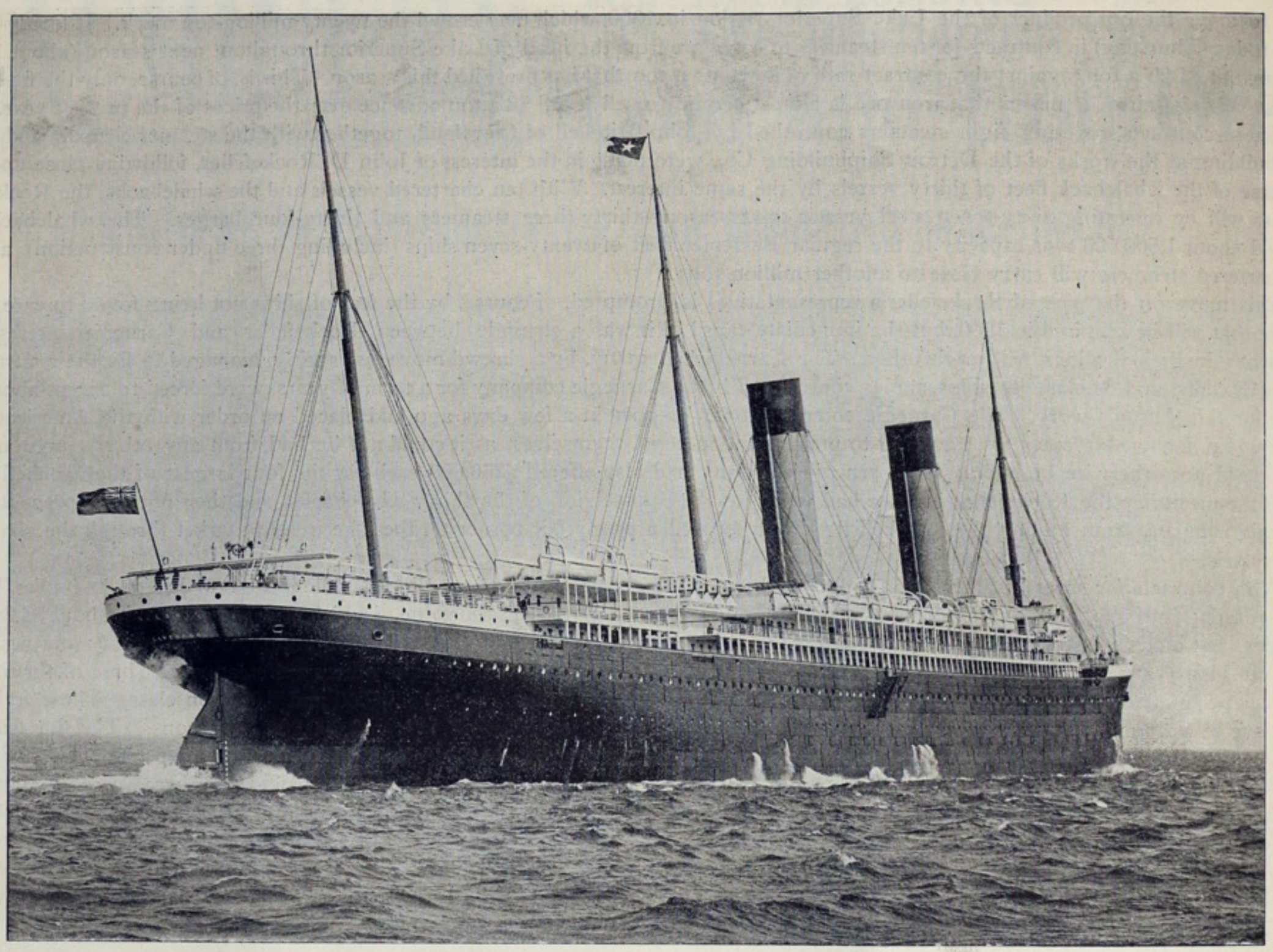
Headquarters of the company will be in Pittsburg but the Cleveland offices will conduct a very important part of the business of the consolidation and it is not probable that all of the active officers—president, secretary and treasurer—will of necessity reside in Pittsburg.

William E. Woodall & Co. of Baltimore are at work on a three-masted wooden schooner which will have a capacity of 400 tons. The vessel will be 115 feet in length and 28 feet beam.

MAGNIFICENT DECORATIONS AND FURNISHINGS OF THE OCEANIC.

Through the courtesy of its enterprising London contemporary, Syren and Shipping, the Marine Review is enabled to reproduce herewith several very interesting photographs of the White Star liner Oceanic—the largest vessel in the world. The stern view gives perhaps the best idea of the bigness of this huge boat that has yet been pictorially conveyed, while the interest in the interior views is enhanced by the fact that this is the first time they have been presented on this side of the Atlantic. The Marine Review has already so fully described, in a generay way, the splendid new steamer that to dilate further upon particulars of hull or machinery would prove useless.

The interior decorations and furnishings of the Oceanic are fully in keeping with the other points of perfection. The visitor to the vessel is impressed at once with her luxury and roominess, the saloons, state rooms, promenades and alleyways being commodious in the extreme.



STERN VIEW OF THE WHITE STAR LINER OCEANIC—LARGEST VESSEL IN THE WORLD.

The state rooms are lofty, well lighted, well ventilated apartments, of which any high class hotel would be more than proud; while the bed furniture, lounges, wardrobes and toilet equipment leave nothing to be desired. The enormous beam of the vessel and her height between the various decks or floors has rendered possible the construction of rooms, as will be seen from our illustrations, of a size hitherto unknown on shipboard. Naturally, with such splendid possibilities it was desired that the decorations of the principal apartments and staircase should be in all respects worthy of the vessel herself. The decoration scheme was therefore entrusted to the eminent architect, Mr. R. Norman Shaw, R. A., who has succeeded in making a step forward in ship decoration as decided as is the ship herself from a mechanical point of view.

One of the most striking apartments in the ship is the library, which is situated on the promenade deck. Its spaciousness is evidenced by its dimensions, for it is 53 feet long, 40 feet wide and 9 feet 6 inches high from floor to ceiling. The plan of this room is unique and charming, the builders having broken away from the long straight sides, often so monotonous a feature of rooms on shipboard, and formed cosy nooks and corners on each side. The doorway, which opens into a recess, is of rich mahogany, glazed with "petits carreaux," in the manner of a French saloon of the time of Louis XV. Round the room are six bays or recesses adapted for reading or conversation. At the end of the room furthest from the door, is an alcove in which the book case forms the principal feature. The octagonal skylight is 12 feet high, and the boiseries or wood panelling recalls in miniature the treatment of the "Salle du Conseil" at Fontainbleau. The whole of the walls, the main beams of the ceilings, and the stanchions are beautifully enriched by ornamental details carved in the solid oak. The sliding shutters of the ports are painted graisalle with trophies of the arts, science, and learning. Trophies of architecture, astronomy, sculpture, and literature, are figured in the ceiling around the skylight, while the panels of the ceiling itself are in white, with small ornaments in low relief. The tables, bookcases, chairs and seats are in dark mahogany, richly carved; while the upholstery, which is of jasper velvet, forms a pleasing and striking harmony with the Turkey red carpet. The electric lighting is in keeping with the tasteful elegance of the room itself. In the dome is a circle of sixteen lights, while there are eight lights—two triple—dispersed over the ceiling. All the writing tables are furnished with handsome standard lamps of two lights each; while to complete the illumination of this one apartment there are twenty-two wall lights, of which eight are three-lights and four-teen two-lights, the handsome ormolu brackets supporting them completing and enriching the panels. The staircase leading from the library is of oak with handsomely carved balustrades. The panels are filled in with scarlet and gold gesso panels ornamented with birds and arabesques of flowers. Descending the magnificent grand staircase, a landing is reached, from which, on the right and left, stairways communicate with the upper deck or first-class entrance. Here all the walls and main beams are cased in oak, framed and dull polished casings, while the ceiling panels and the architectural surroundings of the entrances to the passages are painted white. Once more a flight of stairs lead to another landing on the level of the saloon.

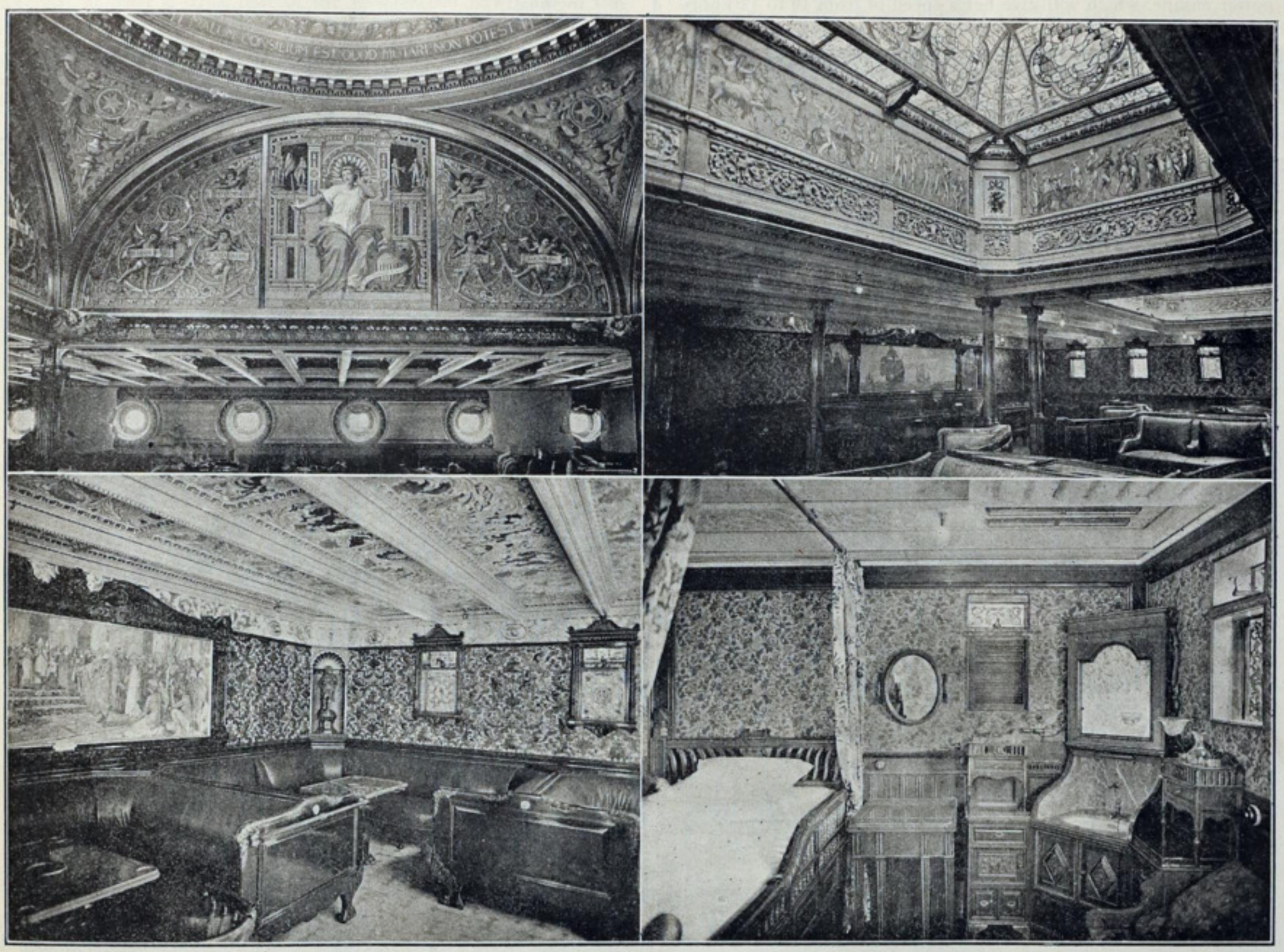
The saloon is a noble apartment, 80 feet by 64 feet by 19 feet to the top of the dome, and has seating accommodation for 350. The dome rises from a handsomely carved and gilt cornice, with cherubs' heads at the angles. The four sides between the pendentives are elliptical lunettes, in the center of which is enthroned a seated allegorical female figure, painted in "sperit fresco," representing Great Britain and America; New York and Liverpool. Great Britain, armed with the trident, carries a shield bearing the royal quarterings, while beside her is couched the lion of England. America holds aloft the cap of liberty on a staff, and her head is crowned with laurels. Beside her is the eagle and shield, bearing stars and stripes, and a scroll endorsed "E Pluribus Unum." Liverpool has by her side a shield bearing the arms of the city. In her right hand she bears the "Caduceus" emblem of commerce, and a label inscribed with the corporate motto: "Deus nobis haec otia fecit." New York is represented by a figure with rays of light emanating from her head, as from the Bartholdi statue, while in her left hand is a rudder and a coil of rope.

The figures, which are of heroic size, are seated on thrones, and around them are clustered figures of the leading lights in art, literature, exploration and war, interspersed with appropriate mottoes. The ceiling of the saloon is panelled out in deep coffers, with richly gilt mouldings, while the lounge surrounding the saloon is upholstered in Genoa velvet of a rich crimson color, and specially designed and woven for the Oceanic. But the most striking feature of a striking and noble apartment is the circular ports. These are surrounded by circular frames of carved oak, richly gilt to match the gilt oak panels of the walls. In fact, the decorative scheme of the saloon may, on account of its gold work and red furnishing, be called "Barbaric," but the effect produced, especially in conjunction with the delicate bluish grey of the table-covers, and the Khiva carpet is peculiarly striking and handsome.

Another "room" on the Oceanic, which has only to be seen to be remembered, is the smoking-room, which is practically a glorified edition of that on the Majestic and Teutonic. The room is surmounted by two large domes, whose tops are wagon-shaped, with provision for ventilation. The lower parts of the domes have richly carved foliated panels, the panels above being separated with ornamental pilasters, with carved caps supporting a moulded and carved cornice. The panels between the pilasters are fitted in with monochrome paintings, representing a Bacchanalian procession, the idea of which was taken from Dryden's "Alexander's Feast." The figures are in outline, and the general effect is both graceful and elegant, and full of spirited animation. The sliding window-sashes on the port and starboard sides are surrounded with polished mahogany frames with ornamental borders, and are fitted with painted and leaded glass panels representing sea nymphs. All round the room is a carved mahogany freize-work, with classic figures supporting panels representing sea nymphs, while the freize is decorated with a background of gold, with cream reliefs delicately shaded. Below the freize at the angles are niches with carved Donatelli figures, while the walls are covered with embossed leather, with the design in high relief in lacquered metal. What will most strike the eye, however, is a series of oil paintings representing scenes in the life of Columbus. The large tryptitch picture on the door-side of the room shows in the center panel "The fleet of Columbus," and the smaller panel on either side "Columbus in sight of land" and "Columbus on board the Nina in the Tagus." The two large pictures on the opposite wall show Columbus announcing his discovery to Ferdinand and his queen, and the landing of Columbus at San Salvador. The pictures are richly framed in mahogany, with pediments reaching to the ceiling ribs. The floor is paved with rubber tiles; the lounges in the center and bays of the room are covered with figured morocco, while the angles of the seats have been filled in with Verona marble, harmonizing with the table-tops, and forming additional stands for glasses. In short, the saloon, library and smoke-room of the Oceanic warrant the vessel being styled, if she had no other claim to the title, the ship of the century.

The second-class accommodation is arranged on two decks at the after end of the vessel. There is, of course, a handsome smoking room for the men, with a library and writing room for the ladies and non-smokers, and a handsome dining saloon with seating accommodations for 148 passengers. The third-class accommodation, as might be expected in so spacious a vessel, is remarkably roomy. The usual White Star practice has been followed, the single men being accommodated in open berths forward, and the single women at the after end of the vessel, with the married couples and families between. Both single women and married people are berthed in closed rooms. Ample deck space is provided for all classes of passengers.

Crew and firemen are berthed away from the passenger spaces, and voyagers will make their Atlantic trip without catching sight of the black squad of 130 who ply their arduous calling far away in the bowels of the ship. The dominating spirit of the ship is Capt. Cameron, R. N. R., and he with his officers are berthed on what has been termed the navigation deck, away from the passengers—a system of isolation which ensures that the captain is only visible to his passengers when he chooses so to be. The officers have on this deck their own mess room, as well as their sleeping accommodation. They are practically a separate community, and are always in the immediate vicinity of the bridge. The commander's apartments are sumptuous, and self-contained with all the adjuncts of a suite of rooms in a high-class hotel. In fact, were it not for the navigational equipments, the captain's quarters might be taken for the chambre de luxe of some millionaire passenger. But though his rooms, with those of his officers, are isolated from the general quarters, the captain, by means of a spiral staircase leading from his rooms, has direct communication with the several decks of the ship, so that he can, without inconvenience or circumlocution, reach the various parts of his mighty command.



DOME OF THE FIRST-CLASS SALOON.
A CORNER OF FIRST-CLASS SMOKING ROOM.

DOME OF FIRST-CLASS SMOKING ROOM.
A FIRST-CLASS STATE ROOM.

Decorations and Furnishings of the Transatlantic Steamer Oceanic—Built by Harland & Wolff, Belfast, Ireland.

BOAT BUILDING AT CHICAGO.

A. G. Cuthbert has had a very successful season's work at his new yard on the island at the foot of Ninety-second street in South Chicago. Improvements have been made on the island in the way of putting in buildings and material for doing the work and a number of boats have been built, among them forty for the South Park and a great many punts and other boats for hunting and fishing purposes, as well as several yachts. He is at present engaged in laying up about two-thirds of the fleet of yachts that has been prominent in the basin at the mouth of the river all summer and has still more to bring down for the winter. Some have been run up on the marine railway and will lie on the island all winter, while the others will simply be stripped and anchored in the slip, lying there under the care of a watchman all winter. The prospects for a full run of work next year are very bright.

DOINGS IN MANY SHIP YARDS.

Ship building on the Pacific coast continues exceedingly active. The steamer Dispatch has been launched at Bendixsen's yard on Humboldt bay. The vessel is being built for Gray & Mitchell of San Francisco. Another recent launch was that of the four-masted schooner Admiral, building at Simpson's ship yard at North Bend, Coos bay, for C. A. Hopper & Co. Wilson Bros. & Co. have just launched a fine four-master at their Gray's Harbor yards and have christened the boat the Henry Wilson. Other launches within a few days are the four-masted barkentine Benicia at Matthew Turner's yard at Benicia and the four-masted schooner Philippine at the yard of Hay & Wright at Alameda Point.

The William R. Trigg Co., Richmond, Va., has practically closed a contract for a stern-wheel steamer for the foreign mission committee of the Southern Presbyterian church. The boat will ply between the mission station on the Congo river in Africa. It is a significant fact that the contract was awarded to the Richmond firm after bids for the construction of the vessel had been received from several prominent British firms. The boat will be 70 feet in length and 13 feet beam and will be fitted with a 70-horse-power engine, which will give her a speed of from 10 to 12 knots per hour. The vessel will be shipped in sections and re-erected on the Congo. The cost of the steamer will be in the neighborhood of $10,000.

The steamer General Hunt, building for the quartermaster's department of the United States army by the R. M. Spedden Co. of Baltimore, Md., is nearing completion. The General Hunt is very similar to the steamer Sentinel, built last year for the government by the same company. She is 91 feet in length over all, 18 feet beam and 10 feet depth of hold. Engines are of the fore-and-aft compound type with cylinders 11¾ and 23½ inches diameter and 20 inches stroke of piston. Steam is supplied from boilers that are capable of a working pressure of 150 pounds. The boat is expected to make 13 knots.

The Neafie & Levy Ship & Engine Building Co. of Philadelphia has launched the steamer Augusta building for the York river line. The new vessel is 20 feet longer than the Charlotte, which she replaces, and has accommodations for 250 passengers. She is engined for a speed of 17½ knots and her pump equipment is entirely of Blake type, including main feed pumps of the Blake cross-compound simplex system.

Arthur Sewall & Co. of Bath, Me., are to build a fleet of seven steel barges for Dimond & Sewall of San Francisco. These vessels will be two-deckers, with poop and forecastle, and their cost will be about $100,000 each. They will be 225 feet long, 42 feet beam and 22 feet deep.

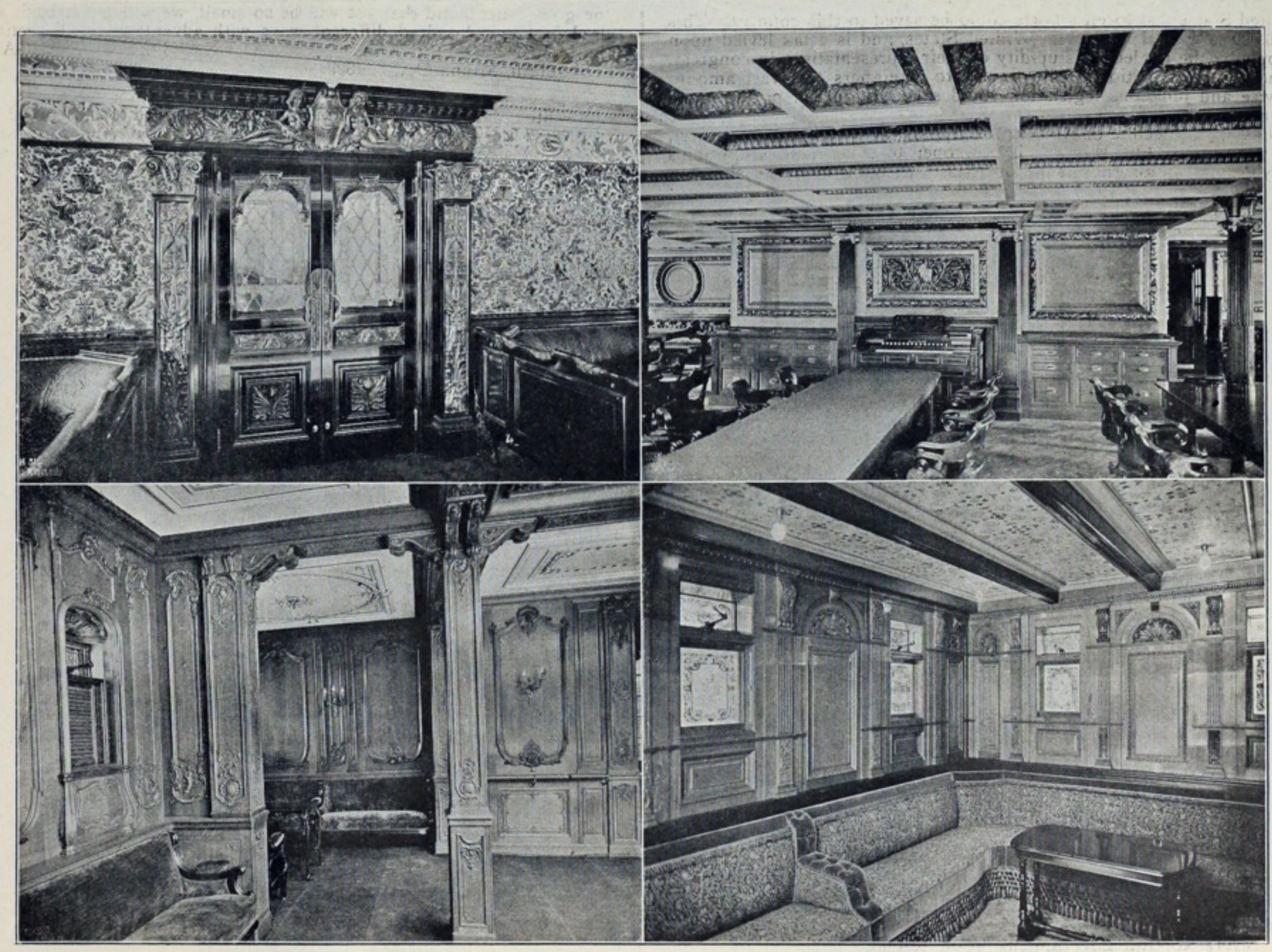
The Canadian Pacific Navigation Co. has made a proposal to the Victoria city council for an improved service between Victoria and Vancouver. They offer to put in service a fast modern steamer, to cost not less than $400,000, if the city will in return grant an annual bonus of $25,000 for ten years, which, it is stated, will be about sufficient to defray the cost of the marine insurance.

The Maryland Steel Co., Sparrow's Point, Md., has about completed the steamer Chester W. Chapin, building for the New York and New Haven service, and has work well under way on the two steel colliers building for the Boston Towboat Co.

The Newport News Ship Building & Dry Dock Co. has launched the steamer El Cid, the third of the Morgan liners now building. This vessel, like her sister ships, El Sud and El Norte, is equipped with a complete outfit of Blake pumps.

The old ship yard of Gessner & Mar at West Haven, Conn., is to be reopened. It is claimed that a contract has been secured for a $100,000 steamer for a Brooklyn firm. John E. Mar will act as superintendent of the yard.

The steamer City of Dayton, building for the Dayton Packet Co., has been launched at the Lockland Dry Docks at Lockland, Ohio, a suburb of Cincinnati.



ENTRANCE TO FIRST-CLASS SMOKING ROOM.
CORNER OF FIRST-CLASS LIBRARY.

PORTION OF FIRST-CLASS SALOON.
SECOND-CLASS LIBRARY.

Interior Views of the World's Greatest Steamer, the Oceanic.

The barge Tennessee, building for the Huntington Towboat & Transportation Co., has been launched at Howard's ship yard at Jeffersonville, Ind.

CARGO RECORDS ON THE GREAT LAKES.

Iron ore—Tow barge John Smeaton, owned by Bessemer Steamship Co. of Cleveland, 7,446 gross or 8,339 net tons, Duluth to Cleveland, draught of 18 feet 1 inch; tow barge Manila, Minnesota Steamship Co. of Cleveland, 7,399 gross or 8,237 net tons, Two Harbors to South Chicago, draught of 18 feet; steamer Malietoa, Minnesota Steamship Co. of Cleveland, 7,335 gross or 8,215 net tons, Two Harbors to South Chicago, draught of 18 feet ½ inch; steamer Henry W. Oliver, Wilson Transit Co. of Cleveland, 7,014 gross or 7,856 net tons, Ashland to Cleveland, draught of 17 feet 10 inches.

Grain—Steamer Superior City, owned by A. B. Wolvin of Duluth, 266,550 bushels of corn, equal to 7,463 net tons, South Chicago to Owen Sound, draught of 18 feet 2 inches; steamer Superior City, owned by A. B. Wolvin of Duluth, 200,000 bushels of wheat and 41,800 bushels of flax, equal to 7,175 net tons, Duluth to Buffalo, mean draught of 17 feet 3 inches; steamer Andrew Carnegie, Wilson Transit Co. of Cleveland, 332,100 bushels of oats, equal to 5,313 net tons, Manitowoc to Buffalo.

Coal—Steamer Hendrick S. Holden, Capt. John Mitchell and others, Cleveland, 6,432 net tons of anthracite, Buffalo to Duluth, on a draught of 17 feet 8 inches forward and 17 feet 1 inch aft.

SAMPSON ON OUR MERCHANT MARINE.

A SHORT LETTER FROM THE REAR ADMIRAL IS ADDED TO THE DISCUSSION RELATIVE TO SHIPPING IN THE FOREIGN TRADE.

Among communications published this week on the subject of our merchant marine in the foreign trade is one from Rear Admiral Sampson. With a view to adding interest to this discussion, the Review has sought the assistance of President Frank J. Firth and other officers of the Lake Carriers' Association to secure letters from men of prominence in Washington, and in fact in all parts of the country. This letter is a reply to a communication which Mr. Firth addressed to Admiral Sampson by our request, specially inviting an expression of his views.

FROM RICHARD P. JOY OF DETROIT.

Editor Marine Review:—In regard to the questions you propound regarding the American Merchant Marine in the oversea carrying trade, I believe it is imperative that a national policy should be inaugurated at once whereby at least a large part of the $250,000,000 now paid to foreigners by Americans for transporting passengers and freights between the United States and foreign ports could be saved to this country. This $250,000,000 is a total loss to the United States, and is a tax levied upon our people by the neglect or stupidity of their representatives in congress. It is the height of national folly to pay to foreigners this vast amount when wise and judicious legislation could save the greater part of it to our own citizens.

The cause of decline of American Shipping in oversea trade is, first, lack of protection. Our shipping is now open to competition from ships of every pauper nation in Europe or Asia. All of this foreign shipping has the benefit of low cost in building their vessels and cheap operating expenses, by reason of paltry wages paid to their seamen. In addition to this, several foreign governments grant tonnage bounties, mail subsidies, naval reserve subventions, etc. How is it possible for Americans to even hope to compete against such odds?

The present condition of our merchant marine is ample proof that competition under these conditions is impossible, and Americans have been compelled to abandon the sea. Compare for a moment our unprotected shipping in oversea trade, which carries only 8 per cent. of our imports and exports, with our protected coastwise commerce, which is carried 100 per cent. in American ships. The object lesson is interesting. The Democratic party proposes to overcome the drawbacks under which American foreign-going ships labor, by free ships; that is, to permit citizens of this country to purchase ships where they can be had the cheapest. But will that alter the conditions? Would our shipping not still have the same competition from bountied, subsidized foreign shipping? If foreigners would give us ships free, we could not operate them in the face of the protection foreigners grant their shipping, coupled with the low wages paid foreign seamen.

The only way in which this nation can wrest a fair share of the oversea carrying trade from foreigners is to fight them with their own weapons—grant to American-built ships bounties, subsidies or discriminating duties favorable to our own vessels. If by the payment of $10,000,000 annually to American ship owners $200,000,000 could be saved to the people of this country every year, it would indeed be a short-sighted policy not to pay it. Such a liberal policy would mean the establishment of new ship yards, employment of capital and labor, and would give to our country ships and seamen in time of war.

The re-establishment of the American Merchant Marine is absolutely necessary to the general welfare of our land. Its present condition is a national disgrace. RICHARD P. JOY.

Detroit, Mich., Oct. 4, 1899.

FROM THE INVENTOR OF THE WHALEBACKS.

Editor Marine Review:—The long-voyage, ocean-going ship is the advance agent of the country to which she belongs. On an average, probably more than ten families have stock or ownership in her; then she has officers of the same country on board; and the officers of the country, who may be stationed in foreign lands as consuls, become interested in her from contact. All these, with the regular ship agents, and the bankers and brokers who come in touch with the ship, are looking up trade for her; and direct trade for her is direct trade for the country to which she belongs. Thus, when you create a ship for foreign trade you have probably a hundred agents engaged in foreign trade, directly or indirectly, for each ship. We have owned so few ships that we are not familiar with the geography or business of the world. This is better illustrated if you visit with an Englishman or other European who lives near the coast.

If we had ships and trade with the world, I think the great depression just passed would not have been so severe. We have the products to make a ton of steel as cheap as any other country. The low cost necessary to put this steel into ships will come later, but with our better-paid crews, etc., we cannot yet operate as cheaply as other nations. We need some help from the people at large for a few years until we learn how to build and operate ships as we have learned to build and operate railroads. Later on the industry can take care of itself without aid from the government, and the cost will be so small, we will get it back a hundred fold in a hundred different ways with advantage to all sections of the United States. ALEXANDER McDOUGALL.

Duluth, Minn., Oct. 5, 1899.

THE SUBJECT AS VIEWED IN IOWA.

Editor Marine Review:—Your editorial in regard to the United States merchant marine in foreign trade, has been received and read with interest. The subject to which you invite attention, has in the past, to persons situated as we are, at a distance from great waterways, seemed unimportant in comparison with other great questions. But the magnificent work of the navy in the last year and a half has drawn the attention of people of the United States, wherever situated, to the ocean and to its empire-building possibilities. This feeling and interest will, I am convinced, be of direct aid in the work in which you are engaged. The history of navigation on the great lakes, with its increased tonnage and financial results during the last open season, is to me a marvel; that at the head of Lake Superior there is developing such trade and commerce as to make it as a shipping point second only to New York, is an indication of unparalleled prosperity.

I think that congress should give to the subject of our merchant marine in foreign trade the most careful attention. I believe that a commission of able men should be appointed to make it a special study, and their report should be a full and comprehensive resume of the whole subject. Upon this could be founded efforts that would not fail of success.

Marshalltown, Iowa, Oct. 2, 1899. J. L. CARNEY.

FROM A MEMBER OF THE TAX COMMISSION OF TEXAS.

Editor Marine Review:—I am too busy now preparing the report of the Texas Tax Commission, which has been examining the tax laws of this and other states for the past several months, to prepare my views on the subject of foreign trade shipping in such manner as I would like to do, but I am in favor of encouraging the building and owning of ships by our people engaged in the foreign carrying trade, inasmuch as it would retain in this country, in the course of a few years, many hundred millions of dollars for ocean freight that now goes into the pockets of foreigners. I would like to see the ships that carry our commerce not only built and owned in this country, but to see their officers and crews American citizens. I think that the ownership and control of our shipping, and the construction of the Nicaragua canal would be one of the greatest causes of prosperity for the southern states, as well as the entire country, that could be inaugurated. O. B. COLQUITT.

Austin, Texas, Oct. 2, 1899.

REVIVAL OF OUR MERCHANT MARINE A QUESTION OF PRIME IMPORTANCE TO THE COUNTRY AT LARGE, SAYS REAR ADMIRAL SAMPSON.

UNITED STATES FLAGSHIP NEW YORK,
Fortress Monroe, Va., October 7, 1899.

DEAR SIR—Pardon the seeming neglect of your letter of Sept. 18. I have been so busy with work incident to the Dewey celebration in New York and Washington that private matters have had to wait.

I would be much pleased to contribute my ideas on the subject of the degeneration of our merchant marine, and the need of its revival, for I feel, as every seafaring American does, and every good American should, that the question is one of prime importance to the country at large. I regret, however, that I am too busy, and have the prospect of being too busy for a long time to come, to make it possible to give to such a subject the attention that it deserves.

I trust you will express my regrets to the editor of the Marine Review, and to assure him for me that I am prevented by press of work from attempting a task which it would be a pleasure to execute, had I the time to devote to it.

Very respectfully,

(Signed) W. T. SAMPSON, Rear Admiral, U. S. Navy.

FRANK J. FIRTH, ESQUIRE, President Lake Carriers' Association,
26 So. 15th street, Philadelphia, Pa.

ORGANIZATION AND DEVELOPMENT OF THE UNITED STATES LIFE SAVING SERVICE.

AN INSTITUTION WORTHY OF A GREAT GOVERNMENT.

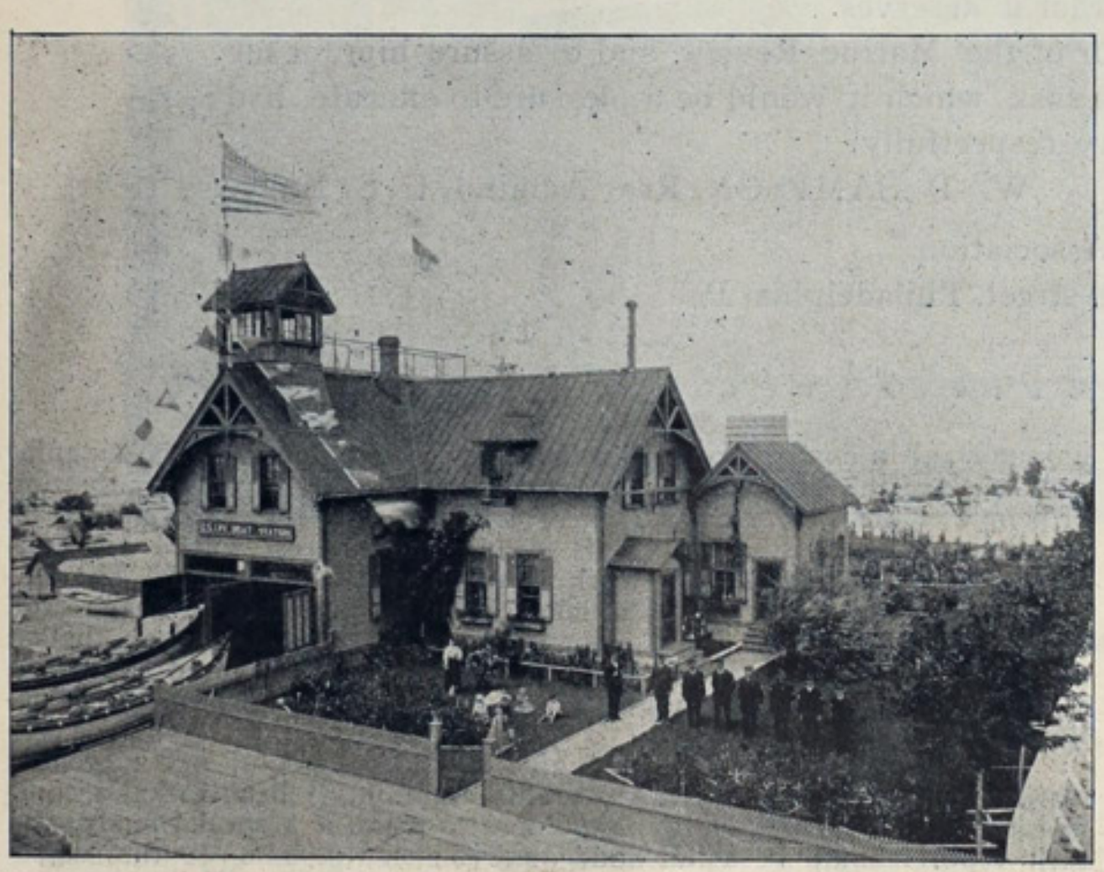
FROM DATA FURNISHED BY SUMNER I. KIMBALL, CHIEF OF THE SERVICE.

The life saving service of the United States as a governmental undertaking is really of recent date. Originally it was conducted as a private or charitable enterprise. The work was first undertaken by the Massachusetts humane society and the first life saving station in the United States was established by the society at Cohasset in 1807. It was really a volunteer service and perforce had to be of limited extent. In 1849 the government voted a little money to the society. The extension, in 1872, of the government life saving service to Cape Cod relieved the society of its charge in that locality and permitted it to concentrate its attentions to the Massachusetts coast.

The life saving service as a systematic enterprise really has its date from the establishment of the coast survey. This movement in aid of commerce extended to the light-house system, which by 1837 had 208 fixed and floating lights in operation. Further effort then lay dormant until 1848 when congress appropriated $10,000 for providing surf boats and other appliances for rescuing life and property from shipwreck on the coast of New Jersey. Out of this sum eight buildings were erected. Congress gradually built upon this sum until in 1854 there were twenty-three life boats on Lake Michigan and several others at various points on the Atlantic and lake coasts. Exclusive of the boats at the fifty-five stations on the New York and New Jersey coasts, there were in 1854 eighty-two life boats at different localities elsewhere.

During all this time however there was very little actual system observed. The life boats were frequently let out to private parties and but little effort was made to keep the stations in repair. Meanwhile frightful wrecks were occurring, which were deeply stirring public sentiment. In 1869 an amendment was urged to the appropriation bill in congress providing for the employment of crews of surfmen at the stations. This was urged with much eloquence but defeated. Hon. S. S. Cox secured the employment of a substitute amendment, which provided for the employment of crews at alternate stations. It remained for a series of most frightful disasters during the winter of 1870-1871 to stir the government into action. Congress in 1871 appropriated $200,000 and authorized the secretary of the treasury to employ crews of surfmen at such stations and for such periods as he might deem necessary.

Mr. Sumner I. Kimball took charge of the revenue marine service and the life saving stations. At his instance Capt. John Faunce of the revenue marine set out on a tour of inspection. A sorry condition of affairs was discovered. The investigation disclosed inadequate stations and defective apparatus. Larceny was everywhere rampant, every portable article being stolen from the stations. The keepers frequently lived at a distance from their posts and many of them were too old for competent service. The work of resurrection began in earnest. Competent crews of surfmen were employed and the system of coast patrol adopted. It is to this system of coast patrol that much of the success of the life saving service in saving lives is due. During the winter following the organization of the system



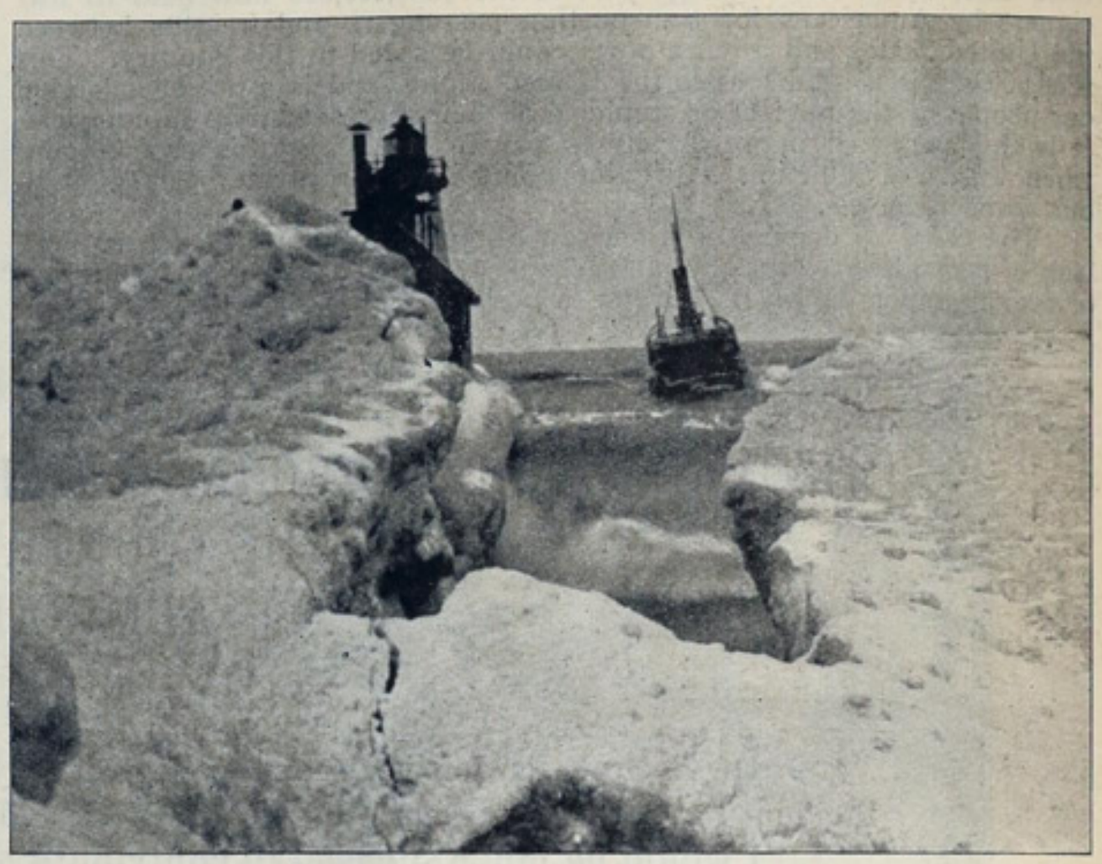
MUSKEGON LIFE SAVING STATION.

every person imperiled by shipwreck was saved. The success of this season excited lively interest in the service.

LEGISLATION THAT CREATED THE SERVICE.

The success of the service induced congress, in March, 1873, to extend the system to other coasts, and mainly by the efforts of the Hon. John Lynch of Maine, a leading member of the committee on commerce, a bill was passed appropriating $100,000 for new life saving stations and calling for a report of points for others upon the sea and lake coasts with detailed estimates of cost. This legislation resulted in the creation of two new districts, one embracing the coasts of Maine and New Hampshire, the other the coasts of Virginia and North Carolina between Capes Henry and Hatteras, and placed five new stations on the Maine coast, one on the New Hampshire, five on the Massachusetts, one on the Rhode Island, three on the Virginia and seven on the North Carolina. The operations of the service of the year had meanwhile been actively continued. The storm signal system of the signal service had been connected with seven stations on the New Jersey coast, an appropriation of $30,000 having been made by congress for the general connection of the system with the life saving stations and light-houses. The record of the season at its close showed 1,165 lives saved on the three coasts; only two lives were lost.

In 1875 the work of creating the stations authorized by the law of the previous year was actively pushed. Six stations on the Maryland and Virginia coast were completed and put in operation, involving the organization of an additional district, No. 5. A life raft was added to the apparatus at several stations. A new self righting and self bailing life boat, devised by Captain J. M. Richardson, the superintendent of the first life saving district, of much less weight and draught than the English type



RESCUE AT ST. JOSEPH, MICH., CITY OF DULUTH, JAN. 26, 1898, 40 LIVES SAVED.

of boat was stationed for trial at Whitehead island, Maine. The storm signal system was still further extended to several of the Atlantic stations. The number of persons saved from wrecks was 729.

The year 1878 is the most memorable in the history of the service for active efforts. The life saving establishment at the close of 1878 embraced 148 stations. Of these eighteen were life boat stations, sixteen of them on the lakes and two on the Pacific coast, together with five houses of refuge on the coast of Florida. In the latter part of 1878 two new life saving stations were built on the coast of Long island—one at Coney island and the other at Short beach. Two of the old stations were rebuilt and twenty-six others repaired. A code of signals for communication between vessels in danger or distress and the life saving stations was devised by the signal service and signals for similar night communication were brought into communication. A line of telegraph built by the war department for the signal service between Cape Henry and Cape Hatteras, running in the neighborhood of several of the life saving stations on the North Carolina coast and communicating with headquarters at Washington, proved of great benefit to the establishment of affording instant intelligence of wreck operations. Preparations were made by the chief signal officer, at the instance of Mr. Kimball, for establishing telephones at twelve of the stations on the same coast for the purpose of accomplishing inter-communication with the keepers, which has since been put into effective operation.

So has the life saving service of the United States government grown until now it embraces 264 stations. Of this number 192 are situated on the Atlantic and gulf coasts, fifty-six on the coasts of the great lakes, fifteen on the Pacific coast and one at the falls of the Ohio, Louisville, Kentucky. The number of stations located in each of the several districts is as follows:

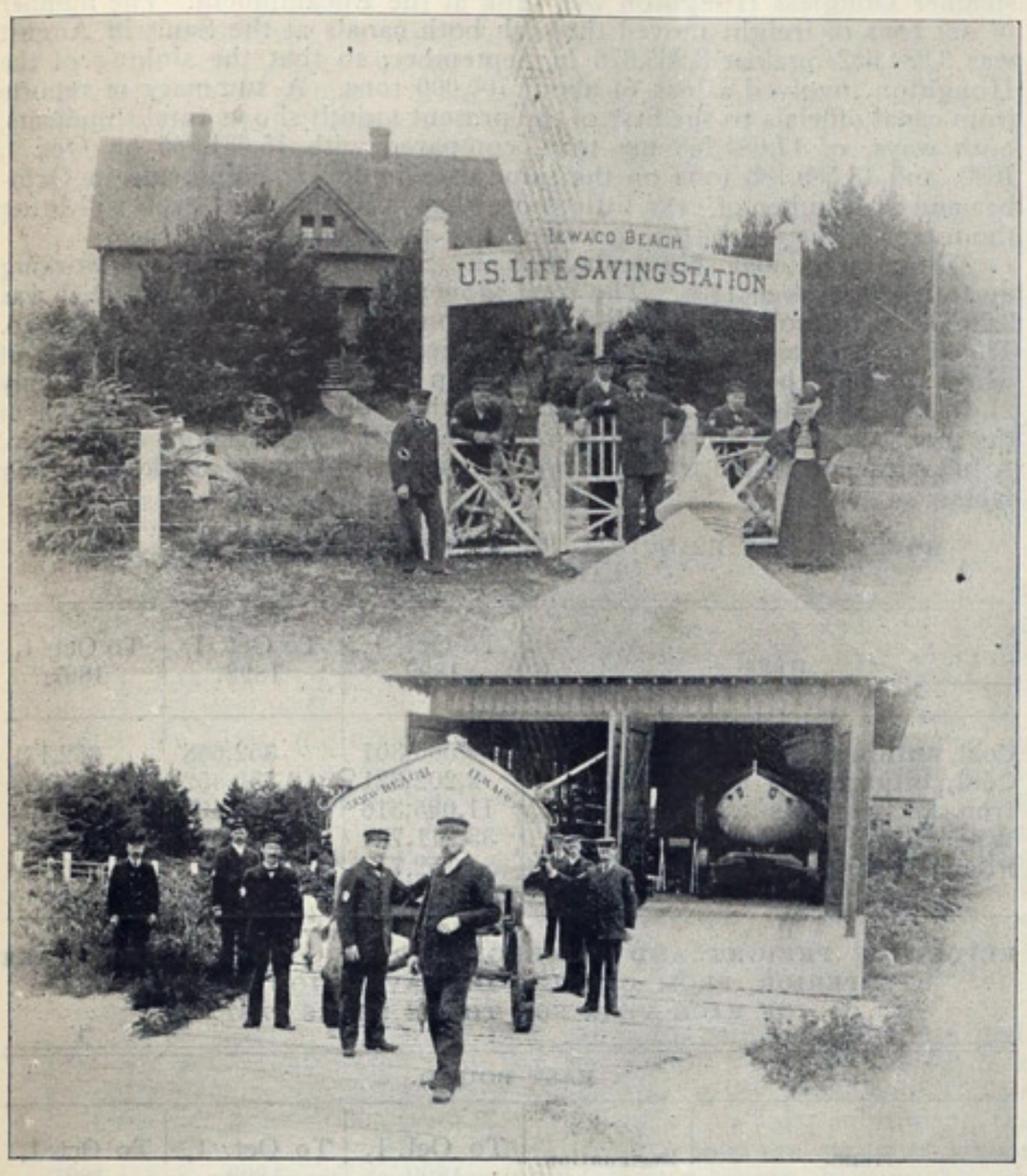
THE SEVERAL DISTRICTS AND STATIONS.

	Number of Stations.
First district—Coasts of Maine and New Hampshire	13
Second district—Coast of Massachusetts	29
Third district—Coasts of Rhode Island and Long island	40
Fourth district—Coast of New Jersey	42
Fifth district—Coast from Cape Henlopen to Capt Charles	18
Sixth district—Coast from Cape Henry to Cape Fear river	31
Seventh district—Coasts of South Carolina, Georgia and eastern Florida	11
Eighth district—Gulf coast	8
Ninth district—Lakes Erie and Ontario, including Louisville station	12
Tenth district—Lakes Huron and Superior	17
Eleventh district—Lake Michigan	28
Twelfth district—Pacific coast	15
Total	264

Reports of the several district officers for 1898 show 402 disasters to documented vessels within the field of life saving operations during the

year. The number of persons on board these vessels was 3,113, of whom only twelve were lost. The estimated value of the vessels was $5,861,320 and that of their cargoes $1,307,070, making the total value of property imperiled $7,168,390. Of this amount $6,410,530 was saved and $757,860 lost.

The number of vessels totally lost was fifty-nine. There were also 365 casualties to undocumented craft—sailboats, rowboats, etc., carrying 874



ILWACO BEACH STATION AND CREW.

persons, ten of whom perished. The value of property involved in these instances is estimated at $199,705, of which $177,825 was saved and $21,880 lost. The total number of disasters exceeds that of the preceding year by sixty-eight and is the largest number reported in the history of the service, while the loss of life is considerably less in proportion to the number of disasters than in any previous year.

In the majority of life saving stations the first floor is divided into four rooms—a boat room, a mess room, a keeper's room and a store room. Wide double-leafed doors and a sloping platform, extending from the sills to the ground, permit the running out of the heavier equipments from the building. The second story contains two rooms—one is the sleeping room of the men, the other has spare cots for rescued people and is also used for storage. The more commodious stations have two additional rooms—a spare room and a kitchen. In localities where good water cannot be otherwise obtained, cisterns are provided for water caught from the roof. There surmounts every station a lookout or observatory, in which a day watch is kept. The roofs upon the stations on those portions of the coast exposed to view from the sea are usually painted dark red, which makes them distinguishable a long distance off shore. They are also marked by a flag staff 60 feet high, used in signaling passing vessels by the international code.

The stations other than the house of refuge are generally equipped with two surf boats, a boat carriage, two sets of breeches, buoy apparatus, including a Lyle gun and accessories, a cart for the transportation of the apparatus, a life car, twenty cork jackets, two heaving sticks, a dozen Coston signals, a dozen signal rockets, a set of the signal flags of the international code, a medicine chest with contents, a barometer, a thermometer, patrol lanterns, patrol checks or patrol clocks, the requisite furniture for rude house keeping by the crew and for the succor of rescued people, fuel and oil, tools for the repair of the boats and apparatus and for minor repairs to the buildings, and the necessary books and stationery. At some of the stations the Hunt gun and projectiles are supplied and at a few the Cunningham rocket apparatus. To facilitate the transportation of boats and apparatus to scenes of shipwreck, a pair of horses is also provided at stations where they cannot be hired, and to those stations where the supplies and mails have to be brought by water a supply boat is furnished.

The few lake stations located upon sand beaches are similar in all respects to those upon the sea coast, but those situated at the harbors differ from them in that room is provided for a heavy life boat and for a small boat for quick work in the immediate vicinity of the station. The buildings are usually located not far from the water's edge behind one of the piers of crib work forming the sides of the harbor entrance. An inclined platform, upon which are laid two tramways for the launching of the boats, extends from the boat room down to the water through an opening cut in the pier. Cradles or cars are provided, on which the boats are kept mounted and by which they can be put afloat with the men at the oars in half a minute. Exit for the surf boat wagon and apparatus cart is also provided in the rear of the building, in case it should be necessary to transport them along the shore. These stations have telephone connections with the systems of adjoining towns.

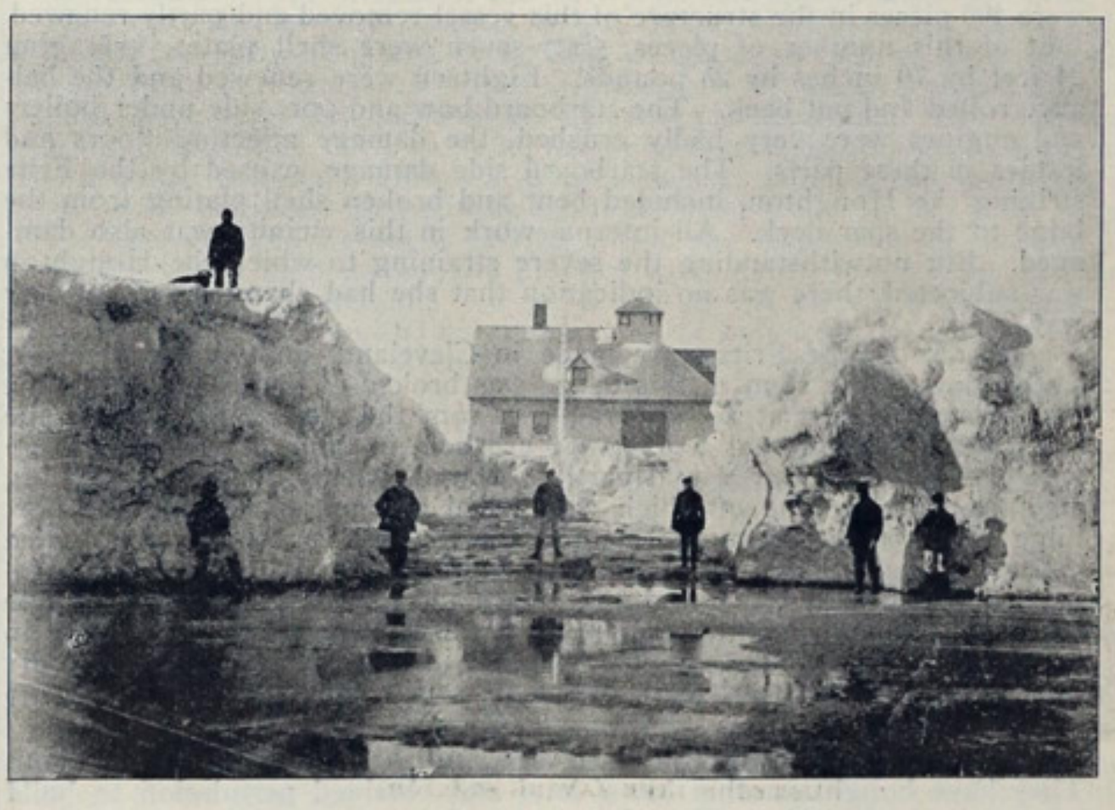
HOUSES OF REFUGE ON THE ATLANTIC COAST.

The houses of refuge on the Florida coast are simple dwellings, not unlike those common at the south, with capacity sufficient for the residence of a family and for the temporary shelter of as many as are likely to need it. The distance between them averages twenty-six miles, and at each mile along the coast are placed guide posts indicating the distance and direction to the nearest station. The houses are supplied with cots and provisions sufficient to succor twenty-five persons for ten days. No boats or apparatus are provided, except a small galvanized iron boat for the use of the keeper.

The crews are kept under constant discipline. Boat practice consists in launching and landing through the surf and at least a half hour's exercise in handling the oars under the keeper's direction. Drill in signaling is conducted by interrogating each surfman as to the meaning of the various flags, the definitions of two, three and four flag hoists, the distinguishing flag or pennant of each hoist, the use of the code book, and by actual conversation carried on by means of two sets of miniature signals provided for each station. Frequent practice is also had between the stations and revenue vessels.

The ultimate means employed by life saving stations to rescue people from stranded vessels are everywhere essentially the same. The tumultuous waters between the wreck and the shore are either crossed by a life boat sent out to the imperilled people or are spanned by strong lines by which a breeches buoy or other vehicle is passed back and forth. There are many kinds of life boats, however, and various devices for effecting line communication. The type of boat in most general use in the United States service, although properly entitled to be called a life boat, is distinctively known as the surf boat. There are several varieties of this type, all developments of the boat found in use among the shore fishermen or surfmen of the Long Island and New Jersey coasts for crossing the surf on the outlying sandbars in their daily blue fishing, when the first boat houses or stations were built there. Three varieties of surf boat—respectively designated the Beebe, the Higgins & Gifford and the Beebe-McLellan from the names of the persons who devised the modifications which characterize them, are the only ones furnished to the stations in recent years. They are all constructed of white cedar with white oak frames and their dimensions are from 25 to 27 feet in length, 6½ to 7 feet beam, 2 feet 3 inches to 2 feet 6 inches depth amidships and 1 foot 7 inches to 2 feet 1 inch sheer of gunwale. Their bottoms are flat with little or no keel and have a camber of 1½ or 2 inches in 8 feet each side of the mid ship section. They draw 6 or 7 inches of water, light, and weigh from 700 to 1,000 pounds. They are propelled with six oars, without sails, and are expected to carry besides their crews from ten to twelve persons, although as many as fifteen have been landed at a time in a bad sea. Their cost ranges from $210 to $275.

For effecting line communication with stranded vessels the United States service chiefly employs the Lyle gun, named after Captain D. A. Lyle of the ordnance department of the United States army, who devised it. It is to be found in every station except the house of refuge. But the Hunt gun, devised by Mr. Edmund S. Hunt of Massachusetts, and the Cunningham rocket, invented by Mr. Patrick Cunningham of the same state, are also employed in stations where the outlying bars are so far off shore that vessels may possibly strand beyond range of the Lyle gun. This has been done, not in the belief that beach apparatus can be



BRANT ROCK LIFE SAVING STATION AND CREW—SNOW AND ICE FROM STORM FEB. 11, 1899.

effectively used at any distance beyond this range, but with the hope that a line, if thrown from the shore to a wreck, might be used to effect the passage of a boat or a life car, or that some other means of rescue might be improvised.

EFFECTING COMMUNICATION WITH STRANDED VESSELS.

The Lyle gun is of bronze with a smooth 2½-inch bore, weighs with its carriage 185 pounds and carries a shot weighing 17 pounds. This projectile is a solid elongated cylinder, 14½ inches in length, into the base of which is screwed an eye-bolt for receiving the shot line, the bolt projecting sufficiently beyond the muzzle of the gun to protect the line from being burned off in firing. When the gun is fired the weight and inertia of the line causes the projectile to reverse. The shot lines used are of three sizes, designated by the numbers 4, 7 and 9, being respectively 4-32,

7-32 and 9-32 of an inch in diameter. Any charge of powder can be used up to the maximum of six ounces. A range of 695 yards has been obtained with the No. 4 line under favorable circumstances. The range of the larger line is of course proportionately diminished. The No. 4 is only used where the vessel is thought to lie beyond the range of the larger lines, for the reason that it is not strong enough to sustain the hauling of the whip line on board—and an intermediate line has to be supplied, requiring the expenditure of time and strength—and because it is not so easily hauled upon by the shipwrecked sailors as the larger one.

The Hunt gun is also of bronze, of about the same size and weight as the Lyle, and not very different from it, except that it has a bore an inch larger and is attached to its carriage bed at the cascabel instead of resting on trunnions. Indeed the peculiarity of the Hunt system is not in the gun but in the projectile, which could be fired just as well from the Lyle gun if the latter were of sufficient caliber. This projectile consists of a cylinder tube of tin, into one end of which is soldered a solid hemispherical piece of lead, which, when the projectile is placed in the gun rests upon the cartridge and upon discharge reverses its position like the Lyle shot and goes foremost. The shot line, being fastened into a staple in the center of the inside surface of this piece of lead, is coiled in the tube until the cavity is nearly filled, being kept in place by a coating of paraffine, which is sufficiently adhesive for the purpose but does not materially retard its paying out as the projectile flies. The tube has a capacity for 320 yards of No. 4 line. In the outer end is placed a diaphragm of pasteboard, with a circular hole in its center three-quarters of an inch in diameter, through which a portion of the other end of the line hangs out. When the missile is placed in the gun, 4 or 5 inches protrude beyond the muzzle. Upon this portion four trapeziform wings are soldered at regular intervals to control the flight. Before firing the protruding end of the incased line is tied to another line coiled in a can, or otherwise so arranged as to permit it to be taken out without entanglement. When the discharge takes place the line in the can, by its inertia and weight, causes the line in the projectile to pay out and when the latter is exhausted furnishes the supply for the remainder of the flight. The range obtained is about 40 yards greater than can be had with the Lyle projectile. The Massachusetts Humane Society uses this system altogether. The United States service prefers the Lyle system.

The Cunningham rocket system may be said to be an application of the Hunt projectile to a rocket. It consists of a powerful rocket, at the rear end of which is a female screw that receives the pointed end of a sheet iron tube 5 feet 9½ inches in length and of equal diameter with the rocket. The tube is packed with 800 yards of No. 4 shot line, which is connected with a shore line in the same manner as in the Hunt system and is paid out in flight as from the Hunt projectile. The tube also takes the place of the stick in other rockets. The shore line can be of any size. The range of the rocket with a No. 4 shore line is from 700 to 1,000 yards, which is diminished with other lines according to their sizes. Several considerations have determined the choice of the gun for general use in the life saving service in preference to the rocket.

A LARGE REPAIR JOB.

The accident to the Rockefeller steamer Douglass Houghton, which was run into and sunk by her consort, the barge Fritz, in the Sault river, early last month, delaying traffic for several days, has also resulted in a very large job of repairs, especially on the Houghton. The Fritz was also considerably damaged, but was again ready for service much earlier than the Houghton. Repairs to the steamer, which was in dry dock at Lorain for eighteen days, were not completed until Saturday last. There were 400 pieces in the structure of this vessel removed and partly renewed. Out of this number of pieces, sixty-seven were shell plates, averaging 24 feet by 70 inches by 25 pounds. Eighteen were renewed and the balance rolled and put back. The starboard bow and port side under boilers and engines were very badly crushed, the damage affecting floors and frames in these parts. The starboard side damage, caused by the Fritz striking the Houghton, included bent and broken shell plating from the bilge to the spar deck. All internal work in this vicinity was also damaged. But notwithstanding the severe straining to which the Houghton was subjected, there was no indication that she had changed form in any way.

Repairs to the Fritz were made in Cleveland and required about twelve days. The stem of this barge was broken at the 3-foot water line and twisted to port at a right angle. From the stem 6 feet aft, all the shell plates and internal work were crushed in and destroyed. There were 140 pieces removed and partly renewed, twenty-one of them being shell plates, only one of which was rolled and put back. On the port bilge about 50 feet from the stem one plate was very badly corrugated and the margin plate and angle bent and broken. In making these repairs the shell plate was faired up in place and the margin plate and angle renewed. Several indentations in the bottom were found, and rivets in floors sheared off, but they were fixed without docking. Robert Curr looks after the ship yard work of the Bessemer company.

The Bath Iron Works of Bath, Me., still keep enlarging their plant. They have bought another lot of land and obtained permission to build out to the harbor line. They have now eleven acres almost covered by splendid modern steel and brick buildings. A new brick hull drawing office, 100 by 60 feet, is now being completed, and the mammoth machine shop is gradually being occupied. The foundry of the Bath works is located at the plant of the Hyde Windlass Co., which is about a quarter of a mile south on the west bank of the Kennebec river. The Hyde company is now furnishing about one-half of the capstans and windlasses used in the country. They also manufacture the well-known Hyde manganese bronze, and they are the sole makers in America of the Brown steam tiller and Brown patents of steering gears.

Jacob C. Cramp, whose death was recently announced, was the fourth son of William Cramp, the founder of the Wm. Cramp & Sons Co. of Philadelphia, and a brother of Charles H. Cramp, who is at present at the head of the institution. He was born in 1835 and retired from business eight years ago.

TWENTY-FIVE MILLION TON MARK.

STILL PROBABLE THAT THAT FIGURE WILL BE REACHED IN THE MOVEMENT OF FREIGHT TO AND FROM LAKE SUPERIOR DURING THE PRESENT SEASON.

It is still probable that the 25-million-ton mark will be reached in Lake Superior commerce this season, notwithstanding the loss due to several days of blockade early in the past month when the Rockefeller steamer Douglass Houghton was sunk at the Encampment. The number of net tons of freight moved through both canals at the Sault in August was 3,984,602 against 3,265,676 in September, so that the sinking of the Houghton involved a loss of about 700,000 tons. A summary of reports from canal officials to the first of the present month shows total shipments, both ways, of 17,684,153 net tons, compared with 15,631,855 on Oct. 1, 1898, and 13,589,183 tons on the same date in 1897. Shipments in October and November of very little more than 3,500,000 tons each will bring the total for the season up to twenty-five millions.

Bituminous coal shipments to Lake Superior are gradually working up to the figures of 1898. The total movement of soft coal to Oct. 1 was 2,202,321 tons, compared with 2,550,452 tons on the same date a year ago. The principal gains are, of course, in wheat and iron ore. Shipments of wheat through the canals to Oct. 1 foot up 33,211,799 bushels, against only 21,414,527 bushels on Oct. 1, 1898, and the iron ore total to the first of the month is 11,095,316 net tons, compared with 9,434,493 tons a year ago. A full summary of the traffic of both canals will be found in the following tables:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Oct. 1, 1899.	To Oct. 1, 1898.	To Oct. 1, 1897.
Coal, anthracite, net tons	565,301	352,668	362,171
Coal, bituminous, net tons	2,202,321	2,550,452	1,145,822
Iron ore, net tons	11,095,316	9,434,493	8,589,702
Wheat, bushels	33,211,799	21,414,527	30,874,381
Flour, barrels	4,752,717	4,541,807	5,766,039

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO OCT. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To Oct. 1, 1899.	To Oct. 1, 1898.	To Oct. 1, 1897.
Copper	Net tons	80,613	87,988	93,098
Grain, other than wheat	Bushels	18,422,016	16,641,400	14,369,367
Building stone	Net tons	21,034	4,670	4,641
Flour	Barrels	4,751,142	4,540,880	5,765,789
Iron ore	Net tons	11,095,316	9,434,493	8,589,702
Iron, pig	Net tons	19,556	26,165	6,687
Lumber	M. ft. b. m.	735,389	660,488	580,043
Silver ore	Net tons	.....	.....	5
Wheat	Bushels	33,211,799	21,414,527	30,874,381
Unclassified freight	Net tons	99,352	174,122	180,659
Passengers	Number	21,586	18,435	17,711

WEST BOUND.

Coal, anthracite	Net tons	565,301	352,668	362,171
Coal, bituminous	Net tons	2,202,321	2,550,452	1,145,822
Flour	Barrels	1,575	927	250
Grain	Bushels	38,500	19,205	.....
Manufactured iron	Net tons	128,339	166,242	84,167
Salt	Barrels	242,837	199,755	172,509
Unclassified freight	Net tons	298,521	278,159	256,751
Passengers	Number	23,665	21,920	19,843

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Oct. 1, 1899.	To Oct. 1, 1898.	To Oct. 1, 1897.
West bound freight of all kinds, net tons	3,222,167	3,376,146	1,883,801
East bound freight of all kinds, net tons	14,461,986	12,255,709	11,705,382
	17,684,153	15,631,855	13,589,183

When there is anything particularly big in the way of pump orders in sight in the great lakes region, W. D. Kearfott of the George F. Blake Mnfg. Co., is usually on hand. He dropped into Cleveland on Monday last and in a few hours returned to New York with the largest single order for pumps ever placed by a lake concern. The order involves the entire equipment of pumps—including Blake simplex, cross-compound, air and ballast pumps—for all four of the 500-foot Wolvin steamers to be built by the American Ship Building Co. at Lorain. These steamers are to have quadruple engines and Babcock & Wilcox water tube boilers.

The Joseph Dixon Crucible Co. of Jersey City, N. J. have sent out invitations to their friends to call and inspect their handsome exhibit of graphite productions at the National Export Exposition at Philadelphia.

THE MODERN WARSHIP AS COMBINING IN ITSELF THE HIGHEST RESULTS OF SKILL, INGENUITY AND SCIENTIFIC KNOWLEDGE.

BY REAR ADMIRAL GEORGE W. MELVILLE,

ENGINEER-IN-CHIEF, U. S. NAVY.*

The subject which has been assigned me is one of the greatest interest to an engineer, for the modern warship is the complete fruition and triumph of so many branches of the great science of engineering. Although in the ultimate analysis we owe everything to nature, we may well say that in the old wooden ships propelled by sails a very large proportion was due almost directly to nature, with only a minor part played by the artisan and the engineer; while in the modern ship, nature's part is strictly confined to the crudest of raw materials, and the finished product represents, as the title of my remarks so well expresses, the highest development of skill, ingenuity and science in engineering and the mechanic arts.

Under the circumstances of this discussion, we may be pardoned if, in a retrospective consideration of the subject, we limit our review to steam vessels, for the reason, as I have already remarked, that the part of the engineer (using that term in its broad sense) in the old sailing vessels was exceedingly limited. We shall, by contrast, be enabled to appreciate more fully the wonderful entity which we call the modern warship if we consider the first one.

FIRST STEAM WAR VESSEL IN THE WORLD WAS BUILT FOR OUR NAVY.

It will interest you all very much, I am sure, to know that the first steam war vessel in the world was built for our navy and was designed by Robert Fulton, who first made steam navigation at all practicable, and the construction of this vessel antedated the founding of this institute only about ten years. This first vessel was called the Demologos or Fulton the First, and while of what would now be considered very small dimensions, was, nevertheless, a wonder of the period. She was 156 feet long, 56 feet beam and 20 feet deep, measuring 2,475 tons, having a single water wheel in a central well, and capabe of steaming about 6 knots. The battery comprised twenty guns of the largest size at that date, a number of them having been taken from a captured British vessel. The hull, of course, was of wood and the boilers were of copper. She was not completed until just after the termination of the war of 1812, so that she never saw any active service, and was blown up by an explosion of her magazine in 1829.

The next steam war vessel, also called the Fulton, and completed in 1837, was somewhat longer than the first Fulton, but with less beam, and proved a very successful ship for the period, being capable of steaming 12 knots per hour under favorable conditions. A most interesting thing in connection with this old vessel is the fact that the engineer who designed her machinery and superintended its erection, became her chief engineer when she was commissioned, and thereby became the first engineer in the United States navy. This distinguished gentleman is still alive and in the active practice of his profession. Doubtless many of you will at once know that I can only refer to Mr. Charles H. Haswell, known to every mechanic in the United States as the author of Haswell's Pocketbook. I think we may all take great pleasure in the thought that this venerable and distinguished gentleman, who is not only the Nestor of our profession but one of its chief ornaments, has been spared to see the growth of the war vessel from the original Demologos to our Oregon and Minneapolis, and the merchant steamer from the original Clermont to the St. Louis and the Campania. After the building of the Fulton, steam vessels were added to the navy at regular intervals, each class making an improvement on the preceding ones, until shortly before the commencement of our Civil War we had a class of fine frigates, which in ordnance, machinery and hull were justly considered the finest in the world.

BEGINNING OF THE EVOLUTION OF THE MODERN WAR VESSEL.

The necessities of the Civil War, of course, gave a tremendous impetus to naval construction, and at this period we have the beginning of the evolution of the modern war vessel. In engineering, as applied to machinery and hulls, several names stand out pre-eminent at this period, and as strictly germane to my theme I may mention the work of two of them. The engineer-in-chief of the navy during this period was Commodore Benjamin F. Isherwood, an engineer whose practical skill, ability as a designer and high scientific attainments have never been surpassed. One of the problems which we had to solve was the construction of machinery which should be thoroughly trustworthy in the hands of men of very limited experience. This led him, contrary to what would ordinarily be considered good designing, but which under the circumstances, in my opinion, was consummate engineering skill, to build machinery very heavy, but which, as a matter of fact, never broke down, and which carried our guns to victory. In those days, just as in our own, the "man behind the gun" may be most in evidence, but without the "man behind the shovel" he would never have been able to get within range of the enemy.

The destructive career of the Alabama had led our authorities to decide upon the construction of a class of vessels which should be faster than any others afloat, in order that these commerce destroyers might be hunted down and themselves meet the fate which they had so often dealt out to others. Here again Isherwood's consummate skill and mastery of his profession showed itself. The material of the hulls was still wood, which gave a platform for the machinery altogether too flexible to permit of the type of engines which we now use; consequently he designed what were known as geared engines, which he, better than anyone else, knew were extremely heavy, but the great point is that they enabled him to accomplish exactly what he set out to do. The Wampanoag, the first of these vessels, in 1868 made the unprecedented record of nearly 17 knots for thirty-six hours in a rough sea, and for several periods of six hours, 17½ knots. At that time no other vessel in the world, either war or merchant steamer, approached this speed within three knots. About this time Mr. Isherwood conducted a number of experiments in connection with the expansion of steam, and boldly enunciated principles which the rest of the engineering world in many cases denounced as erroneous, but which are now accepted as fundamental facts in thermodynamics. This is notably the case with respect to cylinder condensation, where he was the first to enunciate the true principle.

Another great engineer became famous at this time, although he had been doing splendid work and helping to destroy the war vessel before, namely, Capt John Ericcson. You all know the story of the first monitor, and it is not necessary for me to repeat it. I only wish to remark, as apropos of my theme that here was a vessel which in hull, machinery and ordnance was the work of engineers, and which for that period represented the highest embodiment of engineering skill and talent. It is worth noting in this connection that the success of the Monitor in her engagement with the Merrimac was due almost entirely to the skill of her engineers, Stimers and Newton. They were thoroughly familiar with every detail of her machinery, which needed skill to keep it in good order, and, as is well known, after the accident to the gallant commander, Worden, Stimers fought the guns while Lieut. Greene, the executive officer took command in the conning tower. I must not neglect to state that splendid work during this period was done for our ordnance; and the development of this branch of engineering, largely due to the skill and ingenuity of Admiral Dahlgren, was such that at the end of the Civil War our naval guns were recognized as the best in the world.

BEGINNING OF THE NEW NAVY.

There now comes a period in our naval history which, as far as actual results are concerned, may just as well be passed over, for while our designers were keeping abreast of the times, we were not building anything new in either ships, guns or machinery. Beginning with 1883, however, a new era dawned for the navy and we began the building of our white squadron, which has so appropriately been termed the "new navy," and in connection with these new ships I shall endeavor to go into some details which will thoroughly prove the correctness of the theme which has been given me to discuss.

What is the problem that confronts the naval designer? The maximum of offense, combined also with the maximum of defense and with a maximum of mobility. It is important to note the limitation upon the naval designer as regards one vital element, namely, weight, for this has far-reaching effects in every feature of design, and differentiates in a most marked way his work from that of a designer of somewhat similar works for use on shore.

While it has been aptly said that the war vessel is a "gun platform," and it would therefore almost seem that everything else must be subordinated to securing a maximum gun fire, the vessel must be prepared to withstand an attack of an opponent of equal force, which necessitates close attention to the defensive elements. Now, under the very best circumstances, the weight of the bare hull will approach 50 per cent. of the entire displacement, which, as you know, simply means the weight of the completed ship with everything on board, so that we have left only somewhat more than half of the displacement for guns, armor, ammunition, machinery, coal and stores. The first problem, then, is to construct a hull which shall safely carry all the weights, and do so with a minimum amount of material. This is a problem where the skill and ingenuity of the static engineer, for such the naval architect really is, has great room for exercise, and we see it carried out in the disposition of material in shapes which both theory and practice have shown to give the greatest strength for least weight. We see it also in the careful arrangement of frames, keelsons, longitudinal and transverse bulkheads, plating and deck stringers, while the protective deck (popularly supposed to be only for keeping out projectiles) also becomes, in the hands of a skillful designer, an important element of strength.

The ship must also be unsinkable, or at least as nearly so as possible, and this has led to the sub-division into water-tight compartments, and great ingenuity has been displayed in devising schemes for water-tight doors, which are absolutely necessary to give access from one compartment to another, but which, unless very carefully designed and constructed, may in time of need be a source of danger instead of safety. The latest developments in protection against submersion have taken the form of a belt of cellulose, a material which, when perforated by shot and exposed to water, immediately swells up and excludes a further inrush.

Great skill and ingenuity must also be displayed in the proper adjustment of weights to secure correct trim, and this in connection with the form of the ship must be such as to give ample stability, combined with steadiness of gun platform. This is an instance where the modern war vessel is a vast improvement on those of years ago, when the question whether a ship would be an easy or a hard roller was almost entirely a matter of luck. Now it is a matter of calculation and design, and the skillful naval architect is able to guarantee a vessel which will withstand any storm, be comfortable as regards motion, and provide a steady platform for the guns.

HABITABLE AND COMFORTABLE COMPARTMENTS.

We may also note in this connection that the modern vessel is a striking example of what ingenuity and skill can do to make habitable and comfortable compartments that are at best meager and crowded. We ordinarily consider light, water and air as synonymous with what is free and obtainable without effort, yet on the modern war vessel all these elements are due to the skill of the engineer. In place of the tallow candle of our forefathers, we now have the electric light. In place of the casks of water many days old and far from palatable, we have absolutely

*Address delivered on the occasion of the seventy-fifth anniversary of the founding of the Franklin Institute of Philadelphia, Oct. 7, 1899.

pure and sparkling distilled water, which has contributed enormously to the excellent health of our crews, as was brought to the public attention in a most marked way during our recent war with Spain, when the crews of our naval vessels had hardly a man on the sick list, while the armies had enormous numbers ineffective. With its numerous bulkheads dividing it into small compartments, the modern war vessel can have no natural circulation of air, and the engineer provides pure air by artificial means. Steam radiators also make both officers and men comfortable in any kind of weather. As a final item in connection with this branch of the subject we may mention the remarkable development of scientific knowledge, ingenuity and skill in the prediction and determination of powers and speeds for large vessels from experiments on small wax models. Here we have combined the work of the mathematician and the physicist in working out the laws and formula involved, and the skill of the engineer and mechanician in the design and manipulation of the apparatus. ....

Turning now to the question of guns and armor, we have a most marked illustration of the accuracy of our theme. At the close of the Civil War our guns were still principally cast iron smooth bores. Progress has changed all this into the modern high-powered steel breech-loading rifle, weighing many tons and driving at immense velocity a projectile whose encounter with an obstacle may be truly likened to that of one of Jove's thunderbolts. The stress coming upon the metal in one of these guns is as great as can possibly be allowed with safety, and the demands for greater powers have called for all the skill of the metallurgist, combined with the ingenuity and talent of the engineer, in so disposing the metal as to get maximum results with minimum weights. The latest development in these guns, consisting of what is known as the "wire-wound gun," is extremely interesting as showing how a form of construction, which at first sight might seem anything but the best, is nevertheless the disposition of the material which theory shows is most desirable, and practice thoroughly confirms.

PERFORMANCE OF SOME OF THE GREAT GUNS.

It will doubtless interest you to hear a few figures of the performance of some of these great guns. The latest authorities state that a 12.5-inch breech-loading rifle, 50 calibers long, and weighing 83 tons, will propel a shell weighing 880 pounds, by a powder charge of 624 pounds, at a velocity of over 2,620 feet per second, giving an energy at the muzzle of over 40,000 foot tons, capable of penetrating at the muzzle over 45 inches of iron. This energy means that one of our battleships of about 12,000 tons displacement, and which could carry four of these guns would at a single discharge develop a power sufficient to lift her bodily nearly 15 feet. It can readily be imagined, therefore, what the effect of a projectile from one of these guns would be when striking another vessel at close range.

It is an extremely interesting story to read of what has been aptly called the "duel between guns and armor." As fast as one is improved so that its victory over the other seems assured, some inventor comes to the front with an improvement in the latter, which for a time puts it ahead. The armor on our monitors during the Civil War consisted simply of a number of 1-inch plates bolted together. At the present day a modern projectile would go through such armor as easily as a bullet penetrates pine boards, but long ago it was discovered that a given thickness of armor was much more efficient if rolled in a solid plate, and this was developed until some of the older English battleships had iron armor as thick as 24 inches. The development of the gun soon showed that it was impossible to keep pace with it by mere additions to the thickness of the simple armor, for a point was quickly reached where it was impossible to carry the necessary weight of armor that would be thick enough. Then came the use of special plates; the compound armor, where a hard face to break up the projectile was welded to a softer back to give the necessary strength. This was followed by steel armor, and then by the well-known Harvey process, which resembled the compound armor in having a hard face with a softer back, but where the plates were made from a single ingot without any welding. The Harvey process enabled an enormously greater resistance to be obtained with a given weight of armor, but even it has been surpassed by the Krupp process, which enabled 12 inches thickness to give the same resistance as 15 of Harveyized plates. In connection with armor plates great skill and ingenuity has been necessary to provide for giving them the proper shape and for enabling necessary machine work to be done on them after they are in position, inasmuch as the hardening process makes it practically impossible to do any work on the face of the finished plates with ordinary tools. Here an application of electricity for giving a local annealing where it was necessary to work with tools, enabled the solution of this problem.

The work of the artillerist is not confined to the design and manufacture of the guns and armor alone, but the gun carriages are also important features of his work, and here there has been a great display of skill and ingenuity in devising means for the ready manipulation of these ponderous masses, and the control of the recoil, due to the enormous development of energy when the gun is discharged. This is true both of the manipulation by hand and the control of the turn-tables, or turrets, for the larger guns; and the ease with which a turret and its contained guns, weighing several hundred tons, can be controlled by the movement of a single lever so that the pointing of the gun is almost as simple as that of an ordinary musket, is really surprising.

OTHER IMPORTANT FEATURES OF ORDNANCE WORK.

The chemist has also had an important part to play in connection with ordnance work, in the development of powders which would enable the enormous energy necessary, to be developed with safety to the structure of the gun. With the powder used during our Civil War it would be impossible to get the results of today. The development has been through what were known as slow-burning powders down to the smokeless powder of today, where the saltpetre and charcoal of our ancestors have been displaced by the combination resulting from the treatment of cotton with nitric acid. The difference in the energy of the ordinary slow-burning powder and of the smokeless powder now used can be seen by consulting any table where the two are compared. One which I recently examined showed that guns, otherwise practically identical, required with the same weight of projectile three times the weight of ordinary powder to get the same velocity as with smokeless powder.

We must not forget, while discussing ordnance, the remarkable development of what are known as "quick-firing guns." This, as you know, is really the adaptation to large guns of the kind of ammunition and breech mechanism used on the modern small arms, and it has been carried so far that quick-firing guns are now made of as large caliber as eight inch, giving a muzzle energy of over 10,000 foot tons, while the number of times the gun can be discharged in a given interval is about double that of the ordinary breech loader. In the smaller sizes of these quick-firing guns the rapidity of fire is almost incredible, and I remember being particularly struck by the results of repeated trials showing that it was possible from a six-pounder to have five projectiles in the air at once.

More than a quarter of a century ago what are known as machine guns were introduced; that is, weapons of small caliber approximating to that of ordinary small arms and slightly larger, were so arranged that the ammunition could be fed almost continuously, and the rapidity of fire be so great that a single weapon would be equal to a company of soldiers. As you are doubtless aware, the Gatling gun was the earliest of these. These, too, have been developed during the intervening years, until it would seem that finality has almost been reached in the Maxim gun, where when once started it continues to discharge itself by the effect of its own recoil, until the old figure "iron rain and leaden hail" becomes a simple matter of fact. The Maxim gun will fire 600 shots per minute from a calibre of 0.45 inches or less.

MACHINERY OF MODERN WAR VESSELS.

We come now to the machinery of the modern vessel, and I trust that you will pardon me if I go into greater detail here, because this is my own special field and one where it has been my lot to have been intimately associated with the construction of our new fleet. Here, more than almost anywhere else in the war vessel, the constant demand has been for greater power on less weight, and at the same time the demand has also been for thoroughly reliable machinery that would also be economical. Progress has been so rapid that it sometimes seems that we hardly have time to get out a design as nearly perfect as possible and see it thoroughly tested in service before improvements have been suggested that render what appeared so perfect relatively obsolete.

Shortly before I became engineer-in-chief of the navy, forced draft had been re-introduced, after many years of disuse, which at once gave an enormous increase of boiler power with a very slight increase of weight, due to the burning of a much larger amount of coal on a given grate surface. The shell boiler was developed until its design seemed nearly perfect, but we were confronted with the problem of getting plates sufficiently thick to withstand the increasing steam pressures in the large boilers and still be able to properly work the plates in our shops. The weight of these boilers was always very great for the power developed, and in the large sizes which they had reached the utmost skill was necessary for their proper care and maintenance. Shortly before the time had come when further progress with the shell boiler seemed impossible, the water tube boiler was developed to such a point that it gave us the necessary solution of the problem, and it now seems quite certain that, for some time to come at least, the boiler problem has resolved itself into a determination of the best form of water tube boiler, inasmuch as we are sure we can construct boilers which will withstand any pressures that are likely to be used and which are satisfactory in every other respect. These boilers offer almost absolute safety against disastrous explosion, afford a great reduction in weight, and are built to withstand comparatively rough treatment as far as heat is concerned, thus giving freedom from such troubles as leaky tubes and leaky seams, to which large shell boilers were very liable.

The demand for reduction of weights in the engines has been met by the use of stronger materials, and also their disposition in shapes where a given weight of material offers the greatest resistance. We thus have steel castings to replace cast iron; hollow forgings of oil tempered steel, and the use of bronzes of double the strength of the older compositions. Besides the greater strength of the materials, just as important an item is their much greater reliability. Our manufacturers today can furnish us with forgings where we know that the results obtained on test pieces will be absolutely true of every part of the whole mass.

IMPORTANCE OF REDUCED ENGINE WEIGHTS.

Weights have also been greatly reduced by using engines which run at much greater speeds than formerly obtained. This seems a sufficiently simple matter, and yet it was not possible until the improvement came in materials, combined with an accurate scientific knowledge of some of the questions confronting the marine engineer, which had formerly been solved almost by rule of thumb. This is notably the case with propeller design, for it was the mistaken notions on this point that really held down the engine speeds. Inasmuch as the whole office of the motive machinery is to turn the propellers, it might seem that it would be necessary to design the propeller first and make everything else to suit it, but fortunately now that we have accurate scientific knowledge of the conditions governing propeller design, we know that the propeller can be arranged to suit almost any speeds found desirable for the engines, and this enables us to choose engine speeds which will give us both lighter and more economical ones than were possible in olden days.

A problem in the design of engines for war vessels which is of considerable difficulty, and the solution of which is not yet thoroughly satisfactory, is that of securing economical results at ordinary cruising speeds, with the capacity necessary at maximum speeds. As you are doubtless aware, the power necessary to drive a vessel varies approximately as the cube of the speed, so that if, as is ordinarily the case, the cruising speed is about half the maximum, the power to be developed is about one-eighth or less of the maximum. As was very cleverly expressed by one of my former assistants (Professor Hollis) some years ago, the problem is like that of having a beast of burden whose maximum power will be that of an elephant, but whose appetite is so adjustable that he can be economically used for work which could be performed by a donkey. You well know that an elephant would eat about the same whatever work he was doing, and while this is not exactly true of a steam engine, it nevertheless is true that its economy when worked at powers

which are such a small percentage of the maximum is very much reduced. In some of our ships we have tried to solve this by arranging two sets of engines on one shaft, so that at the moderate powers the forward set can be uncoupled. The ill-fated Maine had an arrangement whereby the large cylinders of her triple expansion engines could be disconnected, leaving the engines to run as smaller compounds at cruising speeds. A somewhat similar arrangement is in use on the Nashville, where the large cylinder of a quadruple expansion engine can be thrown out, leaving a triple expansion for lower powers. The objection to all of these is, that if it becomes necessary in an emergency to get full power, it is often impossible to stop to couple up. This was exemplified in a marked way in the case of the Brooklyn during the fight at Santiago. She was cruising with her after engines only when Cervera's fleet came out, and it was felt that there was not time to stop to couple up, which would have necessitated from twenty minutes to half an hour. The distribution of the power among more than two shafts offers another solution, which was used on the Columbia and Minneapolis. Personally, I believe that this system, if properly carried out, would be entirely satisfactory, but it would involve the use of the center screw only for ordinary cruising, and a ship, as you doubtless know, is not so handy with one screw as with two.

LATEST DESIGNS OF ENGINES FOR CRUISING SPEEDS.

Our latest design to meet the desire to use two screws and still get relatively small engines for cruising speeds, is to use three screws but make the engine driving the center one-half the total power, leaving each of the wing screws to develop only a quarter of the full power. We have not as yet built any vessels on this plan, so that, while theoretically we have every reason to anticipate entire success, it has not as yet been tried in practice.

A very interesting illustration of the application of ingenuity and scientific knowledge is the method adopted for balancing the engines so as to avoid vibration of the hull. As engine speeds and hull dimensions increased, there came a combination of circumstances causing excessive vibration of the hull, due to unbalanced inertia stresses of the reciprocating parts of the engines. The solution is a very simple adaptation of a type of engine desirable for other reasons with a special arrangement of crank angles and weights of reciprocating parts. The adoption of the steam turbine has also been suggested to accomplish this same object, and turbines have been employed on some torpedo boats. With certain very promising features, there are, however, some great disadvantages, and before the steam turbine becomes a formidable rival of the ordinary type of engine an enormous amount of skill and ingenuity must be exercised, and the lines along which they can act are not yet apparent.

I have already referred to the three vital elements in warship design as offense, defense and mobility, and the best combinations of these features to secure maximum results tax the judgment and experience of the designer, as well as his skill and ingenuity. If time permitted it would be of the greatest interest to show how the necessity of maximum results in particular items has given us special classes of vessels. Thus in the battleship which must take and give heavy blows, mobility or speed has been sacrificed, while in the armored cruiser both guns and armor have been reduced to secure high speed. In the torpedo boat, speed is absolutely vital and everything else is sacrificed to it. The tendency just now seems to be along the line of having only one class of armored vessels which will be very powerful armored cruisers with good armor protection and high speed. This means a vessel of about 12,000 to 14,000 tons displacement, with 8 to 10 inches of Krupp armor, a battery of 10-inch rapid-fire guns, and a speed of about 20 to 21 knots.

We have now given a hasty glance at the principal elements of the modern war vessel, although I regret that the limited time at my command has forbidden the consideration of many features which could not have failed to be of interest to you, such as the workshops on board where the necessary routine repairs are made to keep the great machine in working order; the electric installation for lighting the various portions of the ship and providing the searchlights; the elaborate drainage system with the necessary pumps; and the torpedoes, with their wonderfully intricate and delicate machinery, which is so arranged as to work automatically after being discharged from the ship, in a way that would seem to indicate human control at every moment. I trust, however, that you will have heard enough to satisfy you that the theme of my remarks is fully borne out by the facts which have been adduced.

THE NAVY HAS KEPT PACE WITH GENERAL ADVANCEMENT.

The truth is that in every department of life there has been a tremendous advance, due to the exercise of skill, ingenuity and scientific knowledge, with which the modern war vessel has thoroughly kept pace. A moment's reflection would, of course, make it very clear to us that it would be impossible to build war vessels such as we now possess unless there had been a corresponding development in every other manufacturing industry. Governor Roosevelt, when assistant secretary of the navy, touched upon a very important matter connected with this subject in discussing what was known as the "personnel bill." In comparing the development of naval science to the point where it became necessary for every officer in the navy to be an engineer, so that it is necessary for the modern admiral to know many things of which our great Farragut, for example, was ignorant, he said that it would, of course, require vastly greater skill to handle the complicated mechanism which the modern war vessel is than one of the old ones, but that, just as we had always been able to produce competent men to handle the less complicated vessels of former times, so without doubt we would get competent men to handle those of today. He had learned the fact that the modern warship is a vast engine, and to be properly controlled must be handled by engineers. Congress has, in the personnel bill, provided and directed that, as soon as we can make the necessary arrangements, every officer in the navy charged with the handling of a vessel, shall be a trained engineer, and therefore we may be sure that however complicated and delicate the organisms of the machine become, we shall have officers who, by education and experience, are fitted to properly care for the valuable and delicate machines entrusted to them.

I have had a part in two wars, in both of which the navy played an important part and became dear to the people, and I have also passed through the intervening interval, during much of which the navy seemed to be entirely forgotten. I sincerely trust that, as the late war showed, we not only know how to build good ships but to make them go and to fight them, our fellow citizens in civil life will see to it that the navy is maintained in a state of the highest efficiency, both as to personnel and material, ever ready for efficient use when needed. In this work, which on both sides is a matter for engineers, this institute has a vital interest, and I trust that, just as your influence has for seventy-five years been on the side of general advancement of engineering in the mechanic arts, so it will be on the side of their advancement in the navy.

QUESTION OF ERIE CANAL IMPROVEMENT.

Editor Marine Review:—I don't know whether I ought to reply a second time to the attacks on the Erie canal made by Mr. C. V. R. Ludington of Monticello, N. Y., or not. He was, in his first article, as quoted by the Review, merely talking to the galleries and continually made the wildest statements, confident, to all appearance, that nobody would pull him up for them. Now, in the Review of Oct. 5, he becomes more wary and challenges me to take up the leading argument, so that he can sit under cover and fire at me. This sort of controversy is not so very profitable. However, as he finds eight distinct points in his article that I didn't "answer" and therefore apparently couldn't, I may be bound to try again.

These points are either of so small account as to be hardly worth a second mention or are well-known and were raised at the outset to "fill up," or to create a favorable feeling in the rural and non-canal counties of the state, where anything "agin' the canal" goes. Let us glance at them as he has repeated them.

1. The tonnage of the canal is a matter of 800 grain boats, with say 900 other boats that are not now fit for grain carrying.

2. The tonnage is rapidly decreasing, faster even than the boats decay, as more of them are used for lightering and outside business than used to be.

3. As to what the $9,000,000 did for the canal, ask the boatmen and the insurance companies. At the canal hearing before the Governor's committee in Buffalo this summer the boatmen were positive as to the great benefit. Nobody claims that the best use was made of it.

4. As to further widening anything but the locks, we in Buffalo have never advocated or asked it.

5. The present capacity of the canal has to do entirely with the number of boats that can be locked through the sixteen locks at Cohoes, the slowest point on the canal. No secret about it. A pair of boats will go through in about four hours.

6. This capacity has not been reached long at a time.

7. As to what towns "unaided by railroads," etc., the canal has built up, there are none. If there were, a canal would be the recipe for populating any desert. When the canal has done most of such a work we say it was the canal, and stop there, as anyone knows.

8. Which would we drop if asked to choose, the canals or the railroads? The canals, certainly. So if asked whether we would cut off our right hand or our left we would say the left, but we don't want to spare either.

Now if the above eight crushers have very much to do with the question at issue I am not able to see it. Of course Mr. Ludington tries to make it appear that I was not able or willing to reply to them. Of course, too, he clings to the half-truth argument and talks about the capacity of the canal. It is the paying capacity and nothing else that is pertinent to the question, as Mr. Ludington will see by the following homely supposition: Who will doubt that there are wagons enough in the country to bring all the surplus grain in the west to the seaboard, give them time enough? Then why do we have railroads, but because the "capacity" of the wagons cannot be made to pay? Canal advocates see the paying capacity of the canal disappearing. They believe that for a moderate outlay, a few cents per capita of the people of the state, this paying capacity can be restored. Herein, "the paying capacity," lies all the argument for the canals. Anyone who ignores it by talking of mere floating capacity is willfully misstating the case.

Mr. Ludington has his funny moments now and then. He still sticks to the notion that if DeWitt Clinton had invented the railroad in place of setting up a canal he would have done us much greater service than he did. I will add a new idea to it by asserting with all the earnestness of my being that if Noah had put a steam propeller into the ark he would have been able to bring his menagerie to America! No dispute here.

Mr. Ludington scouts the "talk of the minerals of the Lake Superior region finding transit over the canal." Then why did our most progressive iron men appear before the governor's canal committee at the Buffalo hearing and ask for canal enlargement, saying that they needed it? Why was the point made in one of the sessions of the New York commerce committee here, and made by the committee, that the iron tonnage of the canal had very materially increased of late?

Really I cannot see why Mr. Ludington was "forced" to notice my article, as he says, unless it was to enable him to drop such jewels of thought as these: "The Manchester canal was constructed more than seventy years before any railroad in the world was thought of; Mr. Seymour, state engineer, in 1854, when the celebrated nine-million bill was passed; his great heart and soul would have revolted at the thought of abolishing tolls on our canals," meaning Clinton. And so on, using half truths, like "capacity"; dwelling on antiquated conditions and ideas, as in the days of Clinton; bringing facts and figures up to do duty as falsifiers; pretending, as he does in this article, to think that the lakes are some day to be drained into uselessness by canals, sewers and the like; using the $9,000,000 blunder as a whip to the back of the country voter, refusing to come down to anything like a business-like discussion of the cost to the state of making the canal again a regulator of the commerce of the east; dodging, backing and filling.

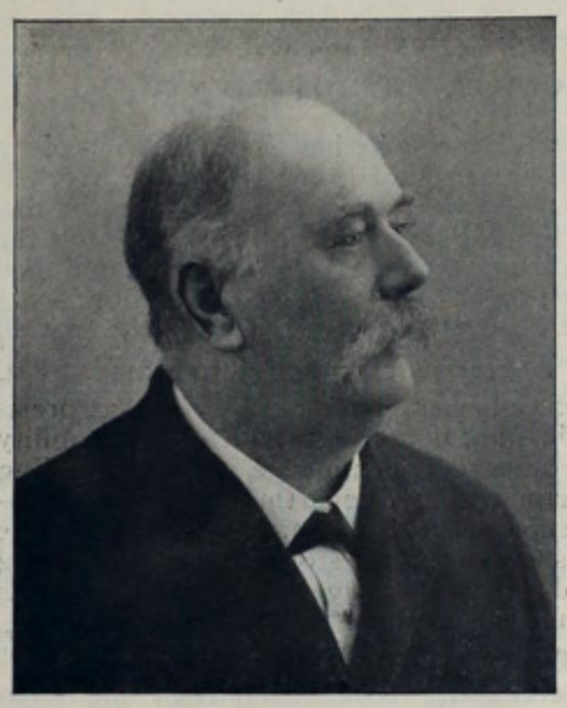
Is it worth any man's while to do the state so conspicuously ill a service? We should say not, unless we were getting ready to run for supervisor of some back town or in need of a railroad pass.

Buffalo, Oct. 7. JOHN CHAMBERLIN.

NATIONAL BOARD OF STEAM NAVIGATION.

ANNUAL MEETING OF THE ORGANIZATION HELD IN NEW YORK CITY—WHO WERE THERE—NEW OFFICERS.

New York, Oct. 6.—(Spl. Cor.)—The twenty-eighth annual meeting of the National Board of Steam Navigation was held in the Transportation Club, Hotel Manhattan, Wednesday, Oct. 4. Little business came before the board, for the reason that the last annual meeting, scheduled to be held in September, 1898, in New Orleans, had to be postponed to April 4, 1899, because of a cholera scare in New Orleans last fall. As there has been no session of congress since April, this meeting of the board lacked the usual discussion of matters marine under consideration by the national legislature.



B. D. WOOD, RETIRING PRESIDENT.

The National Board of Steam Navigation, in the twenty-eighth year of its existence, has brought about salutary addenda and amendments to the shipping laws, through which steamboat interests are better fostered. It aims to secure improved safeguards to life and property on steamboats, fixed and permanent rules for navigation, relief from exactions of patent right vendors and such protection in general as the United States lawmaking power may grant.

The meeting was called to order by President B. D. Wood. Charles H. Boyer of New York was secretary. Among those present at the meeting from New York and vicinity were representatives of all the ferries plying in New York waters, the Red D line of steamships, Old Dominion Steamship Co., Providence & Stonington Steamship Co., Citizens' Steamboat Co. of Troy, Albany Day Line, Cornell Steamboat Co., Shortland Brothers' Lighterage & Transportation Co., Boyer's Flushing & College Point Freight Line, Merritt & Chapman Derrick & Wrecking Co., steamer Caroline Greene, Ronan, Yonkers, Eastern, New York harbor and Mutual towing lines, transportation and lighterage departments of all the railroads hereabouts, and a number of individual towing concerns.

From out of town there were present the following: New Orleans, B. D. Wood, P. F. Renaud, P. J. O'Reilly; Baltimore, Walter Ancker; Philadelphia, A. S. Hughes; Boston, J. P. Rohan; Vicksburg, Miss., J. J. Powers; Louisville, W. W. Hite; Cincinnati, F. A. Laidley, J. D. Parker, F. A. Lothier and O. F. Barrett; Pittsburgh, J. W. Gould, John Moran, J. A. Anderson, S. S. Graham, W. C. Jute and D. D. Blackman.

The morning session was devoted to reports from committees. At the afternoon session the following officers were elected: President, W. W. Hite of New Orleans; first vice-president, A. F. Hughes of Philadelphia; second vice-president, L. M. Palmer of Brooklyn; treasurer, W. J. Wood of Fittsburgh; secretary, Charles H. Boyer of New York; executive committee, F. C. Osborn of New York, J. F. Liscomb of Portland, Me., M. P. Doane of Boston, Fred Russell of Long Island City, D. M. Munser of Brooklyn, J. G. Emmons, W. D. Pollock, W. L. Guilladew, Michael Moran, Robert Rogers, George L. Norton and H. B. Moore of New York, T. H. Marshall of Staten Island, C. W. Wolsey of Jersey City, N. E. Slofer of Jersey City, E. B. Blackburn of Pittsburgh, J. A. Henderson of Pittsburgh, F. A. Landley and F. A. Rothier of Cincinnati, H. C. Haarstick of St. Louis, Robert E. Lee of Memphis, O. G. Ryman of Nashville, E. C. Carroll and Gustav C. Meisonnier of Vicksburg, Miss., and Robert Wilmot of New Orleans.

The following new members were elected: New York—C. H. Mallory & Co., F. W. Munn, Joseph Hand, John Malone, Greenpoint Lighterage Co., George T. Pratt of the floating equipment, Long Island R. R., John D. Dailey of the Dailey Towing Line, James McConnell, representing the Hudson River Towing Line and the General Lighterage Co. Pittsburgh—W. J. Wood, W. W. O'Neill, A. Jute, J. Moren, Hugh Moren, W. W. Crump, J. W. Gould, E. D. Blackburn and J. M. Phillips. New Orleans—International Transportation Co., W. G. Coyle & Co., W. J. Ferguson, A. L. Monnot Coal Co., Jung & Sons, P. J. O'Reilly and the New Orleans & Western Railway Co. Cincinnati—Austin M. Smith, D. J. Hall.

The first and second vice-presidents elect declined their offices and M. E. Staples of Jersey City and R. C. Veit of New York were elected to these places respectively. Mr. Palmer took the place of Mr. Veit on the executive committee and Ex-President Wood that of Mr. Staples. A committee was appointed to report at the next annual meeting on the proper rate of assessment for a combination of steamboat interests, embracing some already in the association. The next annual meeting will be held in Pittsburg on the second Tuesday of September, 1900.

The Bullock Electric Mnfg. Co. of Cincinnati has of late been building up quite a large business with ship builders. This company has adopted a standard size of bulletin descriptive of its machines, which will prove very handy for filing and which should be secured by everybody interested in electrical machinery. Sales of the Bullock company for the month of September involve sixty-one machines, ranging in size from 3 to 150 kilowatts. Among the more important were fifteen engine-type generators for United States army transports and ten 50 horse power motors to operate at 200 revolutions per minute for Messrs. Dick, Kerr & Co. of London, England. Several repeat orders were received, among them being the following: Maryland Steel Co., Baltimore, Md., third order; Consumers Park Brewery, Brooklyn, N. Y., third order; Atlas Cement Co., Northampton, Pa., fifth order; Missouri Lead & Zinc Co., Joplin, Mo., third order.

When representative concerns, such as those named, find it to their advantage to continually add to their equipment of Bullock apparatus, it can mean but one thing, and that is, that the machines have given perfect satisfaction. A new bulletin, No. 5035, just issued by the company, describes type "N" motors. This is the first bulletin of the standard size that has been issued. We believe those interested in electrical literature will appreciate the bulletin of reduced size as it is more readily filed than the larger pamphlets. It may be had by addressing the company.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of Oct. 11, 1899.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	53¾	54⅝	53¼	53¼
American Steel & Wire, Pfd.....	97	97	96½	96½
Federal Steel	55½	55¾	54¼	54⅜
Federal Steel, Pfd.....	79	79	78	78
National Steel	52	.....	.....	52
National Steel, Pfd*.....	96	96	95⅞	95⅞
American Tin Plate	38¾	.....	.....	38¾
American Tin Plate, Pfd.....	86	.....	.....	86
American Steel Hoop.....	44	44	43¾	43¾
American Steel Hoop, Pfd.....	85½	85½	85	85
Republic Iron & Steel	28	28	27¾	27¾
Republic Iron & Steel, Pfd	.....	.....	.....	.....

* Ex. Dividend, 1¾ per cent.

ITEMS OF INTEREST.

An announcement from the United States civil service commission is to the effect that an examination will be held Oct. 17 in every city where the commission has a board of examiners for the grade of nautical expert, navy department, hydrographic office. Examination will be made in letter writing, pure mathematics, physical geography, nautical definitions and navigation. From the eligibles resulting from this examination certification will be made to fill the position of nautical expert, hydrographic office, at a salary of $1,000 per annum.

A stock card issued by the U. T. Hungerford Brass & Copper Co. of New York, must certainly prove valuable and very handy for customers of that concern. This card is made to hang up for ready reference, the old one to be thrown away every time a new one is issued. It gives sizes and other particulars of a stock averaging probably 750,000 pounds all the time, and including brass, copper and yellow metal rods, copper and yellow metal sheets and nails, roll brass, hoop brass, brass in sheets, copper wire, brazed brass tubing, seamless brass and copper tubing, sheet copper, etc.

Electric plants on the battleships Kearsarge and Kentucky, built by the Newport News Ship Building & Dry Dock Co., are the largest and the finest ever installed in a battleship. Each vessel has seven enormous 50-Kilowatt General Electric direct-coupled generating sets. As is usual in the navy, the voltage is 80 and the steam pressure is 110 pounds. Each turret has two 50-horse-power turning motors, besides elevating, ramming and ammunition hoist motors. These vessels are wired on the three-wire system and the motors are operated at 160 volts. The ventilating blowers, outside of the machinery space, are fitted with electric motors. The time is rapidly approaching when all the auxiliaries in a war vessel, outside of the machinery space, will be operated by electricity. United States battleships 7, 8 and 9 of the Alabama class are being fitted with eight 32-kilowatt General Electric generating sets, and the complete installation will be very similar to the vessels of the Kearsarge class.

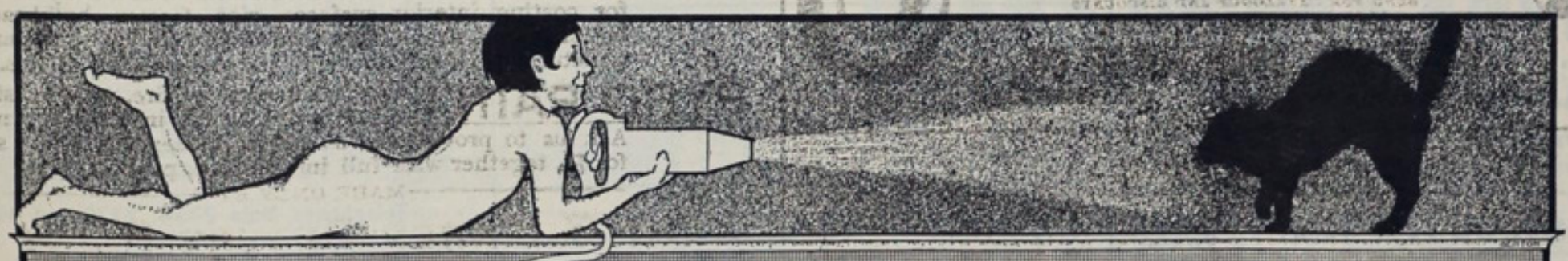
Merchant & Co. of Philadelphia, well-known manufacturers of seamless brass and copper tubes, have just issued a little book that shows in compact form how extensive is the use of the firm's product on mercantile and naval vessels. Among the naval craft fitted with Merchant & Co.'s tubing are the New York, San Francisco, Puritan, Detroit, Newark, Bennington, Dolphin, Terror, Castine, Atlanta, Massachusetts, New Orleans and Prairie. The revenue cutters Algonquin and Onondaga are similarly fitted, as are also the transatlantic steamers St. Paul, Illinois, Pennsylvania, Waesland, Kensington and Ohio.

In "A Call to the Hosts," an artistic little booklet which the Union Steam Pump Co. of Battle Creek, Mich., has just issued for the purpose of enumerating a few of the good points of their well-known pumps, are to be found any number of testimonials of the strongest character from firms known in the ship building and ship owning world. Among the firms which testify to the excellence of the product of the Battle Creek works, are the Pittsburg, Geneva & Brownsville Packet Co. of Pittsburg, Pa., Charles P. Willard & Co. of Chicago, the Marine Iron Works of Chicago, and the Merrill-Stevens Engineering Co. of Jacksonville, Fla.

Mr. Edward W. Hyde, who succeeds Gen. Thomas W. Hyde as president of the Bath Iron Works, Bath, Me., is a young man of great ability and has of late years achieved deserved prominence in ship building circles. He is thoroughly conversant with all departments of the industry, the conduct of which he will supervise. Entering the service of the company in 1889 he was engaged successively as storekeeper, purchasing agent, treasurer, vice-president and general manager. The many friends of Gen. Hyde will regret his resignation, in that it serves as an indication that there is as yet little improvement in his health, which has been poor for some time past.

Of all the steamers that have been following the yachts in the America's cup races at New York, La Grande Duchesse of the Plant line has been the favorite. This is the vessel that is operated during the races under the direction of Editor George L. Norton of the Marine Journal, New York. Readers of the Review are acquainted with the steaming qualities and general excellence of this famous Plant line steamer. Capt. Norton was the originator of the plan of having excursion steamers follow the yachts. He made the first move and now there are hundreds of ships in the service, but none better than the vessel he is connected with when the races are on, and none to give more general satisfaction to patrons.

Applications are being received at the office of the United States light-house inspector, room 1431 Marquette building, Chicago, for the purpose of forming an eligible list from which to fill vacancies for master, mate, engineer and assistant engineer of vessels in the light-house service, which may occur in the ninth district (Lake Michigan) for one year from date of examination.



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U. S. Engineer Office, Milwaukee, Wis. Sept. 20, 1899. Sealed proposals for building Crib Breakwater at Sheboygan Harbor, Wis., will be received here until 12 o'clock noon, standard time. Oct. 24, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs. Oct. 19.

U. S. Engineer Office, Galveston, Tex. Sept. 25, 1899. Sealed bids, in triplicate, for Improving Aransas Pass, Tex., by removing old jetty and dredging, will be received until 2 p.m. Oct. 25, 1899, and then publicly opened. For information apply to C. S. Riche, Capt., Engrs. Oct. 19.

U. S. ENGINEER OFFICE, Montgomery, Ala., October 2nd, 1899. Sealed proposals for building two dipper dredges will be received here until 12:00 M., November 3rd, 1899, and then publicly opened. Information furnished on application to C. A. F. FLAGLER, Capt., Engineers. Oct. 26

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